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EDITORIAL

Remuneration

The methods of remuneration for physicians in this province are being examined extensively from many perspectives and will probably lead to many important changes. The recent initiative of the Medical Society of Nova Scotia, in conjunction with the Department of Health, announces that many services provided by physicians are not free. Completing forms, travel time, medical/legal activities as well as many other services can be billable to the patient or third party; that doctors are entitled to compensation for this will be news to many.

It will be difficult, but essential to educate patients that our time is not fully remunerated by the MSI billing system. Running an office is a business and that we are both allowed to and indeed must recover costs. We must be prepared for a reaction as this will be a new concept for some of the public.

Patients, or doctors, that feel we are already well compensated as a group will not care about this principle and more importantly, will resist its implementation. We should remember that a generation of physicians, that is 25 years of graduates, have now learned almost complete dependence on the MSI billing system. Most physicians who graduated since 1967 have never billed any significant amount to sources other than MSI or have realized that much of what we do was never covered by an insurance scheme meant to cover only medically necessary acts.

By liberally applying our conscience and because it was traditional and acceptable for years, MSI has been billed for third party physicals, occupational health assessment requests, etc. In fact, this practice has been encouraged by governments themselves, in some ways, when blue forms were requested without compensating either the employee or doctor, or when medicals for determining welfare benefits were not compensated.

Generally then, the expectation that a doctor could or would bill a patient has not been fostered. Physician offices today are not set up for billing anyone other than MSI at present and, until recently, were not even set up to bill that source efficiently. Need, desire or means to bill other than MSI has not been present in Nova Scotia for some time. The new initiative to bill for noninsured services is an important change and the pressure for change comes from many directions. Similar initiatives are occurring in Newfoundland, Ontario, Alberta and British Columbia.

The fear that the government cannot continue to cover all services in a time of recession and federal withdrawal is probably founded on fact. Noninsured services are likely to increase in number. Also the Medical Society, in accepting both global and individual capping, has guaranteed that increasing costs cannot be recovered. For example, GST, office staff salaries, supplies, insurance, etc. As well

until manpower control is achieved, the increasing number of doctors in Nova Scotia will aggravate this situation by limiting the amount of work that might be done to recapture costs.

Changing technology is also a pressure to establish other billing mechanisms. As opportunities become available for better quality prostheses and alternative treatments not funded by our insurance plan, pressure to allow patients to pay for what they want will probably develop. In fact without efficient billing systems, increasing demands of employers, schools, camps, etc. cannot be met. Requests for participation in prevention and wellness programs also falls into this category.

Global budgeting has the effect of throwing back to the physicians the need to provide more care for less money. Lower incomes could be accepted if less work were done but expectations and needs will not allow this to happen easily. For those physicians in the lower income levels, any cutbacks can lead to an unacceptable standard of living for themselves and their families. Thus, the necessity to bill patients, third parties, etc. is upon us.

Whether justified or not, resistance will come from physicians and patients who fear the loss of their cherished medi-care system. It is a commonly held belief that we can afford business as usual, if only we have a better management system. Opposed to this attitude are those that feel our medical care system is funded to some extent by our increasing national and provincial debt. To these people, the collapse of socialized systems in Eastern Europe and New Zealand as well as the recession, are all threatening realities. Paradoxically, Nova Scotia's economy does make it a poor time to be billing patients for services. It must be recognized that billing patients for small amounts of money with any assertiveness will not necessarily be productive; since this is still just a small part of our income, keeping the goodwill of the patient will be the choice of many billing offices.

Thus, the generation gap, philosophy, office mechanics, patients and community resistance will all militate against the efficient implementation of the new billing initiative. To say this is not to discourage this initiative but to recognize the realities that must be overcome. Certainly, if we cannot overcome obstacles, self-imposed or otherwise, to bill and charge for our time in a fair manner, we may well have lost the fight to remain independent professionals. If physicians cannot re-establish their desire and right to bill for their services in an appropriate manner, then the majority of physicians in the province would probably be better off receiving a salary for their work with a collective agreement guaranteeing fairness and equity. The success or failure of this billing initiative will determine the direction of our evolution as we attempt to meet the needs of an increasingly demanding public and government.

J.F.O'C

Complex Facial Fractures

A REVIEW OF 81 CONSECUTIVE CASES

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Toronto, Ont. and Halifax, N.S.

Complex facial injuries represent grossly unstable fractures involving multiple sites of the craniofacial skeleton. They are distinguished by the severity of bony disruption and the high frequency of associated neurological ocular and extensive multisystem trauma. Massive impact forces and high velocity trauma are the primary causative factors.

This paper describes the characteristic features of complex craniofacial injuries and outlines the general management. Recent modifications and surgical technique which permit immediate reconstruction are emphasized. Cases are specifically selected to demonstrate the various clinical presentations and reconstructive requirements of these injuries.

THE SERIES

Between July 1988 and December 1990, 81 consecutive patients presented to the Victoria General Hospital and I.W.K. Children's Hospital in Halifax with facial fractures of sufficient severity to require immediate reconstruction, using open reduction, rigid fixation, and primary bone grafting techniques. Sixty-three patients were male and 18 were female. The age at the time of admission ranged from 5 to 70 years of age, with a mean age of 32 years.

METHOD

A standardized data sheet was designed to record details of patient demographics, mechanism of injury, and initial clinical and ophthalmological findings. Standard skull diagrams were further employed in describing anatomical fracture patterns, based on both radiological and intraoperative findings. The data sheet was filled out for each patient at the time of initial clinical assessment and immediately postoperatively.

All data were subsequently entered in a customized computer database and analyzed.

RESULTS

Etiology

The majority of patients in this series sustained high velocity trauma (Fig. 1). Motor vehicle accidents were the most common etiological factor in producing the complex facial injuries (59%), despite the fact that over half the patients reported wearing seatbelts at the time of the injury. Altercations accounted for 24% of the observed injuries, and approximate ¼ of these involved the use of some blunt weapon. The most devastating facial injuries resulted from massive impact forces associated with industrial trauma (4%) and gunshot wounds (2%).

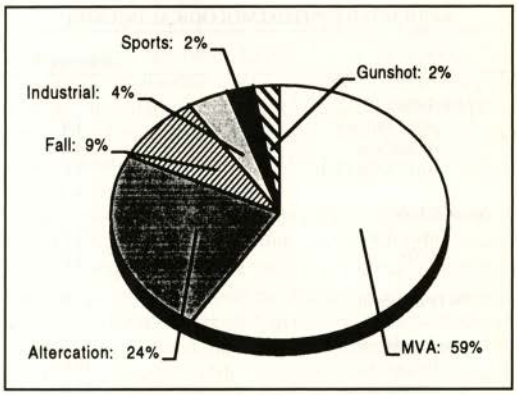

Figure 1

Etiology of complex facial trauma.

Associated Multisystem Trauma

Complex facial injuries were seen in association with multisystem trauma in 51% of patients in this series (Table I). Associated musculoskeletal trauma was most commonly seen.

Of particular note is the fact that 23% of patients sustained a significant head injury, and 13.5% were noted to have cerebral spinal fluid rhinorrhea at the time of admission. There were no patients with C-spine injuries.

TABLE I

ASSOCIATED MULTI-SYSTEM TRAUMA

	Incidence %
Head Injury	23.0
CSF Leak	13.5
C Spine Injury	0.0
Chest Trauma	11.5
Cardiac Trauma	2.5
Abdominal Trauma	1.0
Genitourinary Trauma	7.0
Orthopedic Trauma	32.0

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Associated Ophthalmological Injuries

Trauma to the globe and related structures was documented in 54% of patients. Ocular globe rupture (3 patients) and optic nerve injury (2 patients) resulted in a permanent loss of vision. A superior orbital fissure syndrome, characterized by complete ophthalmoplegia secondary to compression of nerves at the superior orbital fissure, was noted in 1 patient. Mechanical entrapment of extraocular muscles is associated with a loss of bony continuity within the orbital cavity and was seen in 17% of patients in this series. Ocular displacements (proptosis and enophthalmos) indicate a change in the volume of the bony orbit or intraorbital soft tissues as a result of trauma and were commonly identified (Table II).

TABLE II

ASSOCIATED OPHTHALMOLOGICAL INJURIES

	Incidence %
Ocular Injury	
globe rupture	4.0
retinal tear	4.0
corneal abrasion	1.0
Nerve Injury	
optic nerve	2.5
SOFS	1.0
EOM Entrapment	17.0
Ocular Displacement	
Proptosis	18.0
Enopthalmos	33.0

Pattern of Facial Skeletal Injury

The anatomical distribution of fractures was analyzed in an attempt to characterize the pattern of facial fractures resulting from high velocity trauma. Only 18% of patients in this series presented with a fracture restricted to one anatomical site. All remaining patients were found to have multiple fractures involving multiple anatomical areas. For example, only 6% of orbital fractures were seen in isolation, the majority featuring extension of fracture lines into adjacent anatomical sites including the frontal sinus (14%), nasoethmoid (47%), maxilla (57)%.

The incidents of fractures in each anatomical site is demonstrated in Fig. 2. The orbit was most commonly injured while the frontal sinus was comparatively resistant to trauma.

DISCUSSION

Characteristic Features of Complex Facial Fractures

Complex facial injuries are grossly unstable fractures which necessitate open reduction and fixation. These fractures generally result from high velocity or massive

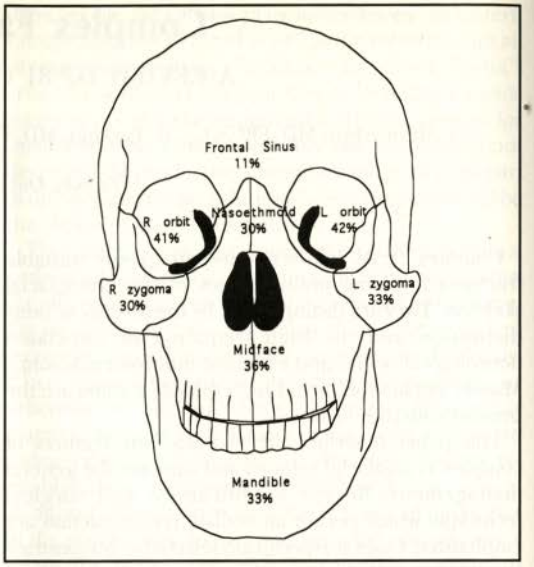

Figure 2

Craniofacial fracture pattern. The incidence of fractures in each anatomical region is indicated.

impact forces. Patients involved in motor vehicle accidents are at particularly high risk of sustaining complex facial injuries, in spite of wearing seatbelts.

Severe pan-facial injuries are frequently seen in association with multisystem trauma. The patients must therefore be assessed according to the standard protocol employed in the initial management of a polytraumatized patient. The incidence of associated regional trauma, in particular head injury, CSF rhinorrhea, and ophthalmological injury are high. A specific neurological and ophthalmological examination are therefore indicated in each case.

Complex facial injuries are characterized by gross disruption and instability of the facial skeleton. Large bone segments are dislocated and displaced. Areas of bone may be extensively comminuted or may actually be lost through mucosal and skin lacerations. Multiple anatomical sites, i.e. orbits, nasoethmoid region, midface, and mandible are generally involved.

Current Treatment

Conventional techniques of fracture management have proven to be inadequate in the treatment of these complex facial injuries. Attempts at closed reduction or internal wire suspension of comminuted areas generally result in eventual bony collapse. The inability to stabilize and reconstruct skeletal segments results in rapid soft tissue contraction and makes secondary corrections difficult or impossible. The recent adaptation of craniofacial surgical techniques, rigid fixation devices, and primary bone grafting have dramatically improved our ability to deal effectively with these severe injuries. The ulitization of

these techniques facilitates restoration of the normal anatomy of the craniofacial skeleton and minimizes the development of secondary deformities.

Rigid Skeletal Fixation

Post-traumatic facial reconstruction relies upon an accurate repositioning of fracture fragments and a functionally stable skeletal fixation. Devices employed in the fixation of fracture segments must generate sufficient static force to overcome all functional forces acting on the bone.[1] These include forces generated by edema, soft tissue scar contracture, and dynamic muscle action. Traditionally, interosseous wires and suspension wires were employed for this purpose. However, in the presence of gross instability and disruption, these methods prove unreliable.

The introduction of rigid internal fixation systems has dramatically improved the results of facial fracture management. Miniature bone plates and screws provide a means of securing a stable three dimensional reconstruction of craniofacial anatomy.[2] Use of these techniques in the fixation of maxillary and mandibular fractures (Fig. 3) further permits earlier mobilization of the mandible.

Figure 3

RIGHT MANDIBULAR FRACTURE.

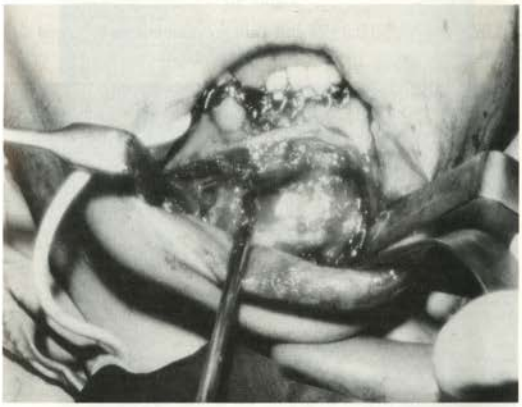

Figure 3A

Through an intraoral incision, the fracture is widely exposed.

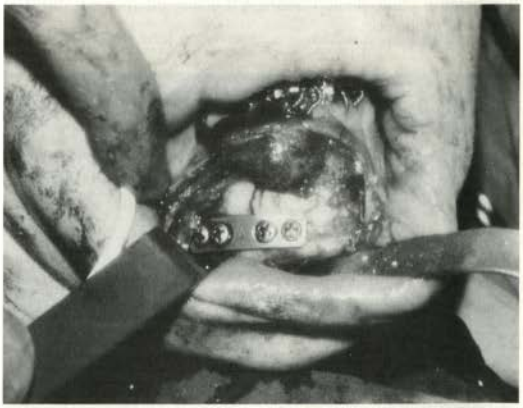

Figure 3B

Anatomic reduction and rigid fixation of the fracture using miniplate and screws.

Craniofacial Exposure

The field of craniofacial surgery emerged as a distinct subspecialty in the 1960s, largely due to the work of Paul Tessier. In collaboration with an excellent neurosurgical and ophthalmological group at Hospital Foch in Paris he established the basic principles which formed the foundation of current craniofacial surgical techniques.[3,4,5]

Currently these principles govern the surgical approach to virtually traumatic deformity. The technique is based on wide exposure of the entire craniofacial skeleton using a combination of coronal, intraoral, and periorbital incisions. The actual reconstruction of the facial skeleton is always performed under direct visualization of all fracture segments, with optimal protection of both intracranial and intraorbital contents.

Case No. 1

A 28-year old male fell from a third storey window sustaining a severe blunt injury to the left fronto-orbital region. Fractures of the skull, nasoethmoid complex, orbital rim and maxilla were evident. Clinical findings included inferolateral displacement of the entire left orbit. The left ocular globe was proptotic and pulsatile, due to a large communication between the orbital and cranial cavities.

Craniofacial techniques were employed in exposing the upper facial skeleton (Fig. 4A, 4B). The neurosurgeons first performed a craniotomy and repaired the dura. The frontal lobe was prolapsed into the left orbital cavity pushing the ocular globe forwards and downwards. Wide subdural dissection permitted retrieval and retraction of the intracranial contents.

This exposure permitted direct visualization of a large defect of the orbital roof which was reconstructed with bone grafts (Fig. 4C). All associated facial fractures were then sequentially reduced and fixed (Fig. 4D).

Postoperatively the orbital position and ocular projection were found to be symmetrical in every dimension (Fig. 4F). Visual acuity and ocular mobility in the left eye were preserved and there were no residual complaints of diplopia or other visual disturbance.

Figure 4

COMPLEX FRONTO-ORBITAL INJURY.

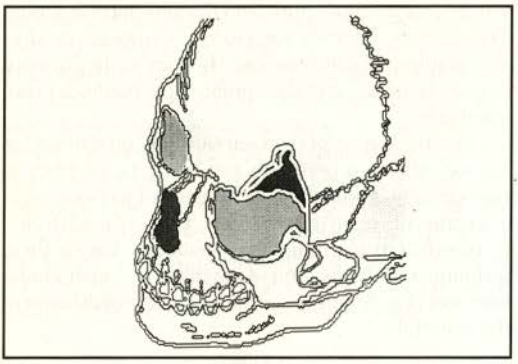

Figure 4A

Schematic diagram indicating the defect in the left supraorbital rim and orbital roof.

Figure 4B

Intraoperative view. The dura has been repaired. Malleable protractors protect the orbital contents while visualizing the defect in the orbital roof.

Figure 4C

The supraorbital rim and orbital roof defect have been reconstructed with bone grafts.

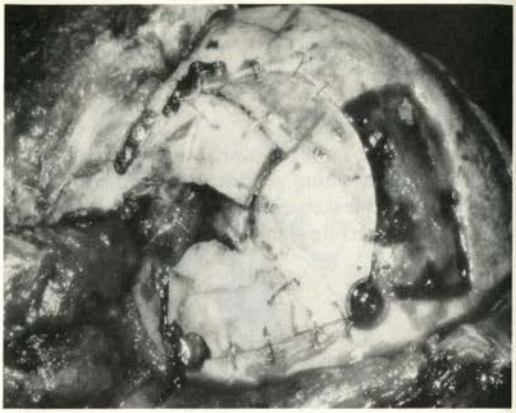

Figure 4D

Fractures of the orbital rim and skull are anatomically reduced and fixed.

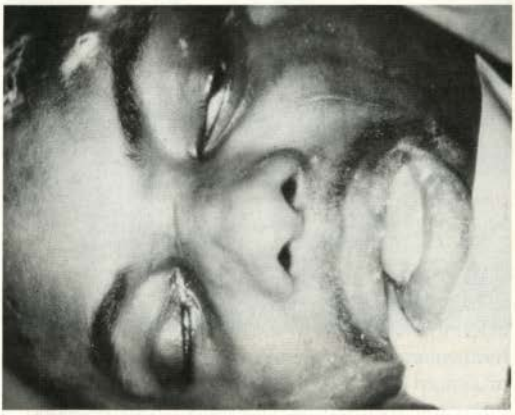

Figure 4E

Preoperative photo demonstrating left ocular inferolateral displacement and proptosis.

Figure 4F

Final result three months postoperatively.

Primary Bone Grafting

Immediate bone grafting adds a new dimension to the treatment of complex facial trauma. Use of this technique permits restoration of bony continuity regardless of the extent of comminution or bone loss. Osteosynthesis is increased and stability is significantly enhanced, minimizing the degree of relapse and secondary deformity.

Figure 5

RIGHT ORBITOZYGOMATIC INJURY.

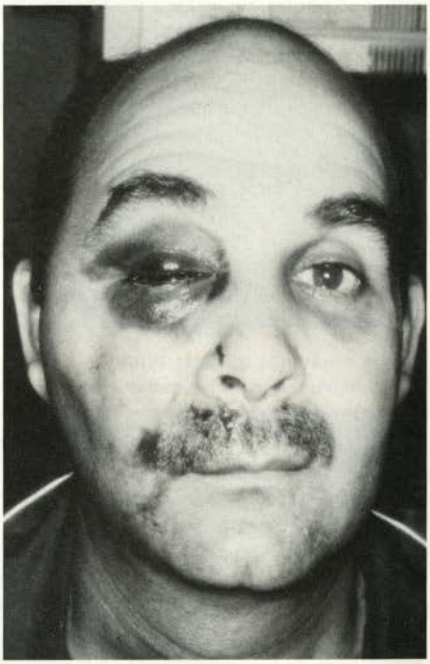

Figure 5A

Note right periorbital ecchymosis and medial displacement of the malar prominence.

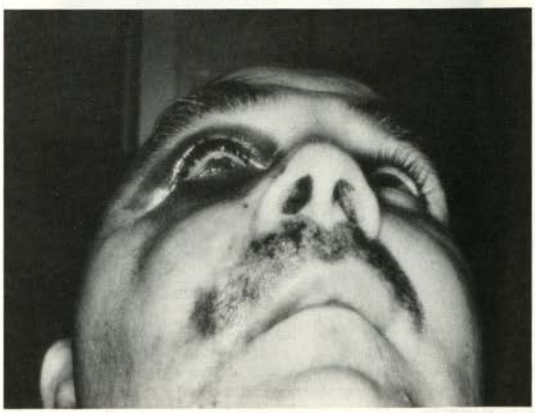

Figure 5B

Note the proptosis of the right ocular globe.

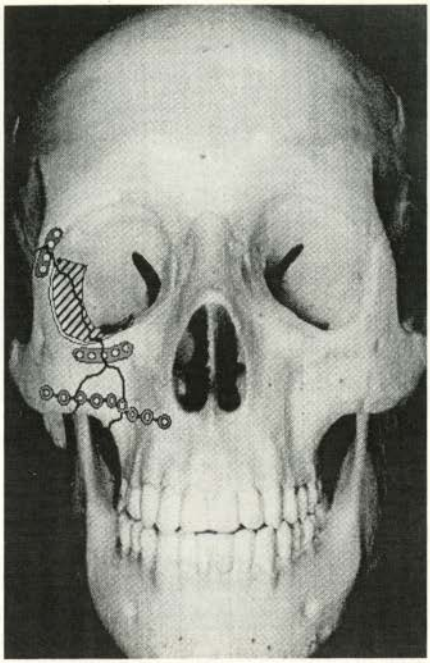

Figure 5C

Schematic diagram indicating the reconstruction of the fractured right zygoma, and bone graft in the right inferolateral orbit.

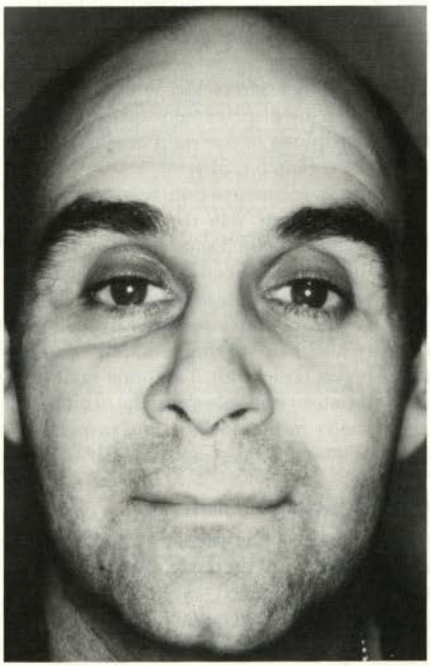

Figure 5D

Postoperative result, frontal view.

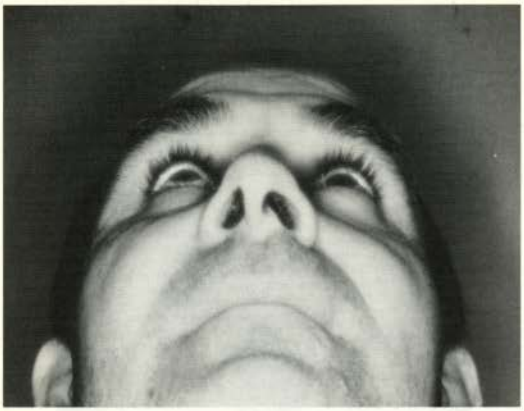

Figure 5E

Postoperative result, brow-up view.

Gruss in 1985 first described the results of primary bone grafting in severe facial fractures.[6,7] Replacement of all severely damaged or missing bone resulted in a stable framework for the midface and maintained soft tissue expansion during the healing phase. Subsequently, in a review of 49 orbital fractures requiring autogenous tissue grafting, Antonyshyn, Gruss and coworkers reported superior results when bone grafts were used in orbital cavity reconstruction.[8] The incidents of residual strabismus, enophthalmos and globe ptosis were far less.

Case No. 2

A 42-year old fisherman presented with a complex right orbitozygomatic injury following a rupture and rapid recoil of a block and tackle. The patient presented with gross posterior displacement of the right zygoma and marked proptosis of the right ocular globe. Vision remained intact. (Fig. 5A, 5B).

An immediate reconstruction was performed (Fig. 5C). The right orbit was decompressed through periorbital incisions. The fractures of the right zygoma were anatomically reduced and rigidly fixed with miniplates and screws. Intraoperatively, a large defect was noted involving the inferolateral portion of the orbital cavity and this was immediately reconstructed with an iliac crest bone graft. The bone graft effectively restored the contour and volume of the orbital cavity and normal symmetry in the position and projection of the ocular globes was achieved (Fig. 5D, 5E).

Primary Soft Tissue Reconstruction

Although most of the recent advances of fracture management have focused on the development of techniques for improved skeletal reconstruction, meticulous repair of injured soft tissues must not be neglected. Rather than simple approximation of lacerations, disrupted ligaments must be precisely relocated and avulsed soft tissues accurately draped over the reconstructed facial skeleton to ensure optimal results.

Case No. 3

A 25-year old sustained a high-velocity kick-back injury while working in a sawmill. The injury resulted in a complete avulsion of the soft tissues of the nose and right periorbital region with shattering and loss of bone in the right inferomedial orbit, nose, and maxilla. The optic nerve was injured resulting in a permanent visual deficit.

An immediate reconstruction was performed. Split skull and iliac crest bone grafts were employed in the primary reconstruction of the nose, right maxilla and orbital cavity (Figs. 6B, 6C). Avulsed soft tissues were then advanced superomedially. The disrupted mediocanthal ligament was reconstructed and both the mucosal lining and cutaneous cover of the nose were repaired.

Figure 6

AVULSIVE FACIAL INJURY.

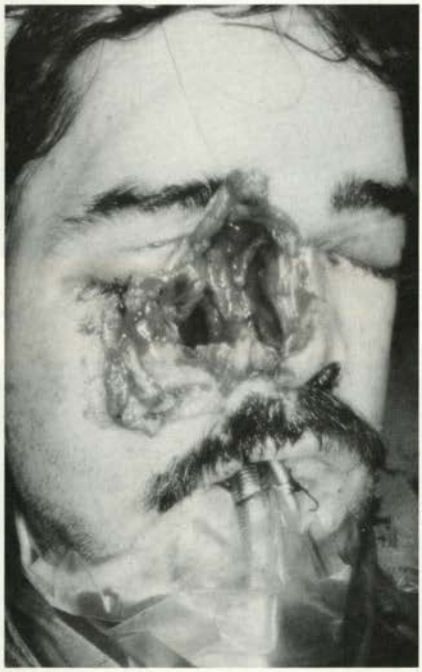

Figure 6A

Compound injury resulting in avulsion of the right hemi-nose. Within the defect, note complete absence of bone in the central midface and orbital regions.

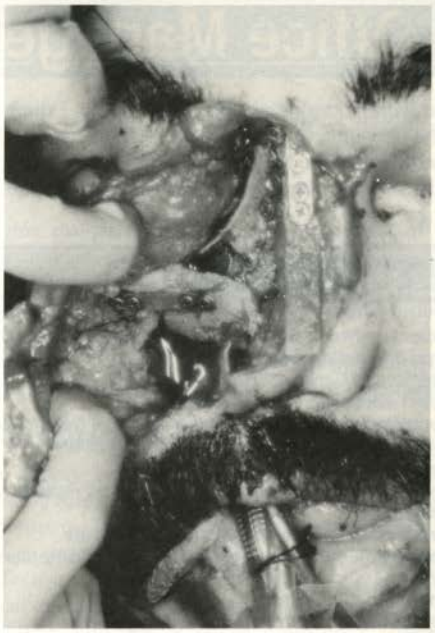

Figure 6B

Intraoperative view demonstrating bone graft reconstruction of the nose, orbital cavity, and maxilla.

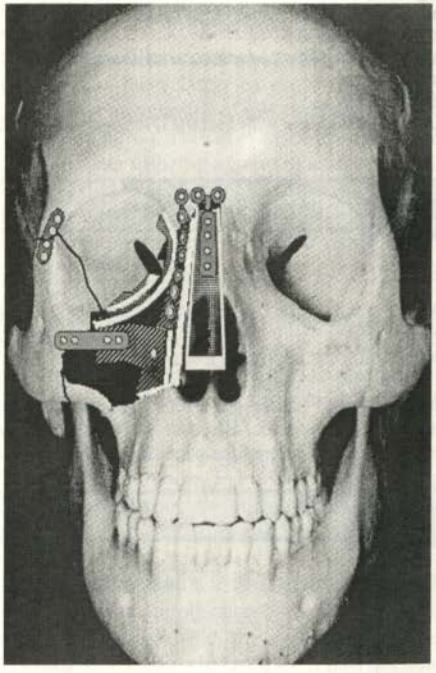

Figure 6C

Schematic diagram indicating location of the bone grafts and fixation devices.

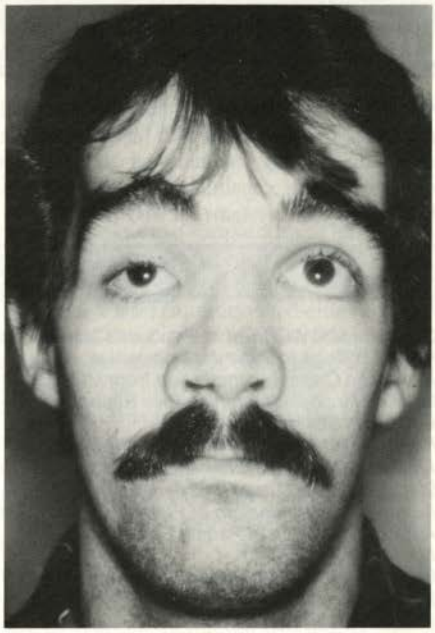

Figure 6D

Result one year postoperatively.

SUMMARY

Complex craniofacial fractures result from high velocity injuries or massive impact trauma. These injuries are characterized by gross disruption of the facial skeleton, and are frequently associated with trauma to intracranial or intraorbital soft tissues. Immediate facial reconstruction, using rigid fixation techniques, complete craniofacial exposure and primary bone grafting, is now routinely employed in the treatment of these injuries and provides optimal results and earlier rehabilitation. □

References

1. Spiessl B: "Principles of rigid internal fixation in fractures of the lower jaw". In Spiessl B. (ed.) *New Concepts in Maxillofacial Bone Surgery,* New York: Springer-Verlag, p.21.
2. Antonyshyn O, Gruss JS. "Complex orbital trauma. The role of rigid fixation and primary bone grafting." In *Advances in Opthalmic Plastic and Reconstructive Surgery.* Ed. L. Bosniak. Pergamon Journals Ltd. Vol. 7, p.61-92, 1988.
3. Tessier P. "The definitive plastic surgical treatment of the severe facial deformities of craniofacial dysostosis". *Plast Reconst Surgery* 1971; **48**:419.
4. Tessier P: "Orbital hyerletorism: I. Successive surgical attempts. Material and methods. Causes and mechanisms". *Scand J Plast Reconstr Surg* 1972; **6**:135.
5. Tessier P, Guiot G, Detrome P: "Orbital hypertelorism: II. Definite treatment of orbital hypertelorism by craniofacial or by extracranial osteotomies". *Scand J Plast Reconstr Surg* 1973; **7**:39.
6. Gruss JS, "Naso-ethmoid-orbital fractures: classifiction and role of primary bone grafting". *Plast Reconstr Surg* 1985; **75**:303.
7. Gruss JS, Mackinnon SE, Kassel EE, Cooper PW: "The role of primary bone grafting in complex cranio-maxillary trauma". *Plast Reconstr Surg* 1985; **75**:17.
8. Antonyshyn O, Gruss JS, Galbraith D, Hurwitz J: "Complex orbital injuries: a critical evaluation of immediate bone graft reconstruction". *Ann Plast Surg* 1989; **22**:220.

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Lasers in Surgery and Medicine

PART 1

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In this two-part article, the development of laser applications in surgery and medicine is discussed. The main purpose is to explain why lasers are increasingly being found in clinics and operating rooms around the world, pointing out their usefulness as well as their limitations. Commonly used lasers, applications and exciting developments in laser surgery are also presented.

DEVELOPMENT OF A NEW MEDICAL TOOL

The theory behind *Light Amplification by Stimulated Emission of Radiation* was formulated in 1917 by Einstein. The acronym, *laser* has since become a buzzword that is heard in everyday language. The laser has proven to be an effective means by which doctors may treat many medical diseases.

In 1955, Gorden *et al.* at Columbia University announced that they had built the first device based on Einstein's theory.[1] However, it involved microwaves which, like light, consist of electromagnetic radiation but at longer wavelengths. It was dubbed, *maser*. Its practical uses seem to be limited to radioastronomical work, satellite communications and microwave spectrometry.

The first laser was built a few years later. In 1960, Maiman announced a device in which a ruby cylinder was stimulated by a flash lamp to emit electromagnetic radiation with a wavelength of 694 nm (deep red).[2] The laser produced light pulses of ½ msec duration. Months later, the first laser utilizing a gas as its active medium was developed at Bell Telephone Laboratories. This was the Helium-Neon (He-Ne) laser with a wavelength of 633 nm (red). It also happened to be the first continuous wave laser, meaning that it could operate continuously rather than just produce pulses.

The ruby laser had greater potential in treating medical problems than the He-Ne laser, since the former could generate more power than the latter. Experiments were performed in 1963 on rabbits and cats, treating retinal pathology with the ruby laser. Previously, a device known as the xenon-arc photocoagulator was being used to mend retinal tears and holes in human subjects. It emitted an intense, parallel beam of white light but was technically difficult to operate and produced much cruder results than the more sophisticated laser. In 1964, ophthalmologists began using the ruby laser for the same purpose. This was the first successful application of the laser in medicine.

In the years that followed, the ruby laser was used to destroy malignant tumors in animals. It had been hoped that an effective weapon against cancer was at hand, but results in humans were disappointing. There was limited success only with superficial malignancies.

In 1964, the CO_2 laser was developed at Bell. It was a continuous wave laser in addition to being very powerful. It could deliver tens of watts of power as opposed to the milliwatts produced by its predecessors. Its wavelength (10,600 nm) was in the far-infrared region of the electromagnetic spectrum so that the beam was invisible. Light at this wavelength is readily absorbed by water, resulting in its vaporization. Since tissue is composed of 70% to 90% water, the CO_2 laser has excellent incisional capabilities whereas the ruby laser has more coagulative effects, being absorbed mainly by proteins.

During the 1960s, other lasers including the argon with wavelengths of 488 nm and 514 nm (blue and green) and the Nd:YAG (yttrium aluminum and garnet doped with niodymium) with a wavelength of 1,064 nm (near-infrared) were developed. These two and the CO_2 are the most commonly used lasers in clinical practise today.

The early 1970s saw the CO_2 laser being used in many surgical procedures while the argon laser became a work horse for ophthalmologists in treating diabetic retinopathy. During this time, fibre optic technology developed for the argon and Nd:YAG lasers, allowing them to pass through the flexible fibres. This was an extremely practical development and lasers began to be used endoscopically in controling bleeding stomach and duodenal ulcers. The argon laser was used at first, but the Nd:YAG laser dominated later because of its excellent hemostatic capabilities.

In 1979, the krypton laser was also used in treating patients with diabetic retinopathy. It has properties similar to the argon laser, but because of its 350 nm (yellow) and 680 nm (red) wavelengths, it enables working close to the macula without the worry of damaging it. More recently, new lasers have been developed, old drawbacks have been overcome and new applications have been adapted. Even the He-Ne laser is being used therapeutically in Europe and Japan as a 'biostimulant' for relieving pain and promoting healing.

THE PHYSICS OF LASERS

An electron of an atom, ion or molecule may jump from a low energy level to a higher one upon absorption of electromagnetic energy (i). At this point, the atom, ion or molecule is said to be in an excited state. When the electron falls from such a high energy level to a lower one, a photon is emitted (ii). A photon is a discrete 'packet' of light. The wavelength of the photon is dependant upon the difference between the high and low energy levels.[3]

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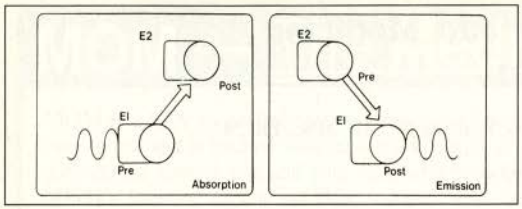

(i) **Figure 1** (ii)

The wavelength of the emitted photon determines the kind of electomagnetic radiation. If it is between 400 nm and 750 nm, it is visible light. If it is between10 nm and 400 nm, it is ultraviolet light and 750 nm to 10^6 nm is considered the infrared range of light. Microwaves and radiowaves have longer wavelengths while x-rays and gamma rays have shorter wavelengths than light.

In lasers, the electrons of atoms, ions or molecules of the active medium fall from energy levels in such a way as to emit many photons all of the same wavelength and phase (meaning the peaks and troughs all line up). This occurs in a chain-reaction fashion. An electron spontaneously decays, where it spontaneously falls from a previously high energy level to its ground energy level, producing a photon in the process (i). This photon may then collide with another atom, ion or molecule in the excited state, resulting in electron decay and emission of a second photon of the same wavelength and phase (ii). The same process occurs again and again resulting in photon or light amplification (iii).[4]

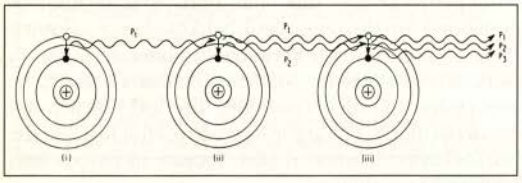

Figure 2

It is necessary that the majority of atoms, ions or molecules of the active medium are at a high energy level so that the process of light amplification may occur. This condition is known as *population inversion*. It is achieved by pumping energy into the active medium using a flash lamp, electric current, radiowaves or another laser.

The beam of amplified light bounces back and forth between two mirrors, one of which is a partial reflector, and upon acquiring enough energy, it passes through the partially reflective mirror.[3]

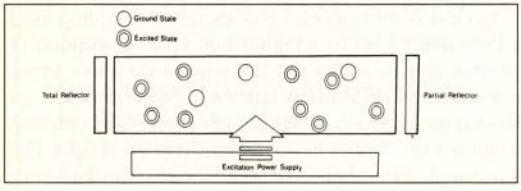

Figure 3

The resulting laser beam is coherent, meaning it consists of a single wavelength and the waves are all in phase. It is also collimated so that there is no divergence of the beam. In ordinary white light, emission of photons occurs randomly, there are many different wavelengths, the waves are not in phase and the beam spreads out in all directions.

There are basically four different types of interactions which may occur between laser beam and tissue. *Reflection* is when the beam bounces off the surface of tissue, resulting in no effect. This occurs in the same fashion as ordinary light reflecting off shiny surfaces. It is also a source of potential danger since the lasing action may occur in an undesireable spot. *Transmission* occurs when the beam simply passes through the tissue. For example, the beams of argon, krypton and Nd:YAG lasers will pass through the cornea and lens of the eye to act directly on the retina.

Absorption is when a small volume of tissue absorbs the beam energy and subsequently heats up. If the tissue remains below 37°C, there is no effect. Heating to 37-60°C may induce welding of tissue. 60-65°C yields protein coagulation and blanching, while 65-90°C leads to protein denaturation. Heating between 90-100°C causes drying and puckering, and when tissue is heated to 100°C or more, the result is vaporization or carbonization and the appearance of smoke. *Scattering* is the situation where the laser's energy is absorbed over a large volume due to its penetration and reflection within the tissue. It is the major cause of damage to tissue in the vicinity of the focused spot. Scatter is the interaction desired when using a laser to necrose a tumour.

In practice, one usually sees a combination of these laser beam-tissue interactions. The exact kind of interaction depends upon the wavelength, power and intensity of the laser as well as the nature of the tissue. For example, the colour of the tissue is a critical factor, as is its water content. Such properties of lasers and tissue must be considered when selecting a laser to produce a desired effect on a tissue type.

COMMONLY USED LASERS

There are many different kinds of lasers being used either clinically or experimentally in medicine and surgery. They are generally named according to the active medium of the laser. Various gases, liquids and solids function as active media. The gas lasers include the CO_2, argon, krypton, He-Ne and excimer lasers. Liquid lasers are referred to as dye lasers and among the solid-state variety are the ruby and Nd:YAG (Yttrium-Aluminum-Garnet doped with Neodymium) lasers. There are even lasers which do not quite fit into these categories, including the metal vapour lasers and the highly experimental free-electron laser. Most of these lasers have their own characteristic wavelength, but the dye and free-electron lasers can be 'tuned' to any wavelength.

The laser used most often in a clinical setting is the argon laser. Its wavelength is either 488 nm (blue) or 515 nm (green) so that it is absorbed readily by melanin

and hemoglobin. It can deliver up to 15 watts of power. Its main uses include treatment of diabetic retinopathy and removal of dermatologic lesions such as tattoos. It induces superficial coagulation, causing necrosis of tissue to a relative depth of 0.5-2 mm. The beam may be passed through fibre optics enabling great versatility, but this is unnecessary for most of its applications. The krypton laser is used alongside the argon very frequently since it functions similarly and may be more useful in certain situations.

The CO_2 laser is commonly found in the operating room as well as in gynecology and dermatology clinics. Because of its long infrared wavelength, it causes vaporization of water to a depth of 30-90 µm regardless of background colour. Newer models can deliver up to 100 watts of continuous power. Thus, it is very effective in cutting tissue. Its coagulative ability is limited to a relative penetration depth of only 0.5 mm. The CO_2 laser cannot be passed through fibre optics and rather, a system of fixed mirrors is necessary to reflect the beam to the desired location. Gynecology, Otolaryngology/Head and Neck Surgery, Dermatology, and Neurosurgery are the fields in which the CO_2 laser is most commonly used.

The laser with the fastest growing popularity is the Nd:YAG laser. It can coagulate tissue to a relative depth of 2-6 mm, but higher power densities may be used to vaporize/cut without deep coagulation if so desired. It is absorbed by virtually all types of tissue. Like the CO_2 laser, it can achieve powers of up to 100 watts but unlike the CO_2 laser, it may be passed through fibre optics so that difficult or impossible-to-reach areas may be operated upon. Nd:YAG lasers are being used more and more frequently in Ophthalmology, Otolaryngology/Head and Neck Surgery, Gynecology, Neurosurgery, Dermatology, Plastic Surgery, G.I. Surgery, Thoracic Surgery, Urology, General Surgery and Vascular Surgery.

Sapphire contact probes have been developed for use with Nd:YAG lasers, which can be attached to the end of fibre optics such that thermal damage is confined to the tip of the probe. Consequently, lasing action will occur only where the probe is in contact with tissue. This means that the laser will allow cutting without deep coagulation so that underlying tissue is unaffected. Tactile stimulation, not present with non-contact lasing, is present with contact-probes resulting in better manual control and shorter learning periods.

ADVANTAGES OF LASER USE IN MEDICINE

There are many obvious advantages in using the laser over the ordinary scalpel. To begin with, lasers allow working on previously inaccessible tissue or provide much greater accessibility to other parts of the body. The retina may be approached through the lens. The cervix may be treated *per vagina* from a distance. A fibre optic may be coaxially passed through an endoscope to direct a laser beam to virtually any point within the body.

In such cases of minimally-invasive surgery, opening incisions are necessary only in a minor number of procedures, resulting in quicker access, shorter operative time and less post-operative pain for the patient. There is also a reduction in the possibility of infectious complications mainly because the laser produces a sterile field and as a result, there is less patient hospitalization time. Many procedures are performed on an ambulatory basis. Topical anaesthetics may simply be required. General anaesthesia is necessary only for more elaborate procedures such as those involving endoscopy.

The coagulative property of lasers means that bleeding can be kept to a minimum since the ends of severed vessels are conveniently sealed as the laser cuts. This effect is best seen with the Nd:YAG laser. A blood-free operative field is clearly a great advantage to the surgeon, allowing better visualization of the operative site.

By adjusting laser power, wavelength and intensity, there is a wide range of effects one may achieve. Cutting/vaporization and necrosis/coagulation may be achieved in any tissue. Even a subtype of tissue may be selectively affected by adjusting laser parameters. Precision is one of the major assets of the laser.

Lasers seem to cause less post-operative pain in general than ordinary scalpels and electrocautery. The end result[5] of transecting nerves using lasers was was studied by Fliglny *et al.* After transecting rat sciatic nerves with laser, ordinary scalpel and electrocautery, retrograde axoplasmic flow of nerve impulses was measured in the proximal end of the severed nerve. It was found that significantly less flow occurred with the laser transections. The results of Hurst *et al.* support this finding.[6] Although the mechanism is not well understood, it is thought that the laser disrupts the microfilaments and microfilament depolymerizing agents which constitute an important part of the axonal transport mechanism.

LIMITATIONS AND POTENTIAL HAZARDS

Being a sophisticated and newly-developed technology, laser systems are rather expensive. Their maintenance is also costly. Special wiring and plumbing for water cooling is often necessary and consequently, the portability of laser systems may be limited.

There are many hazards and complexities associated with laser use and special training for surgeons, anaesthetists and nurses is required. For example, special glasses are often necessary to protect the eyes of patients and medical personnel from accidental laser firing or reflections of the beam. With the Nd:YAG laser, specially tinted goggles that wrap-around the face are required while clear, plastic glasses are sufficient with the CO_2 laser. The laser may accidentally cut or destroy tissue, damage instruments or even cause fires. Anaesthetics must be chosen carefully to reduce the risk of combustion.

Another hazard is that of vaporous by-products of lasing, referred to as plume, which may contain harmful substances. A study published by Baggish *et al.* in 1987 shows that the lungs of rats develop congestive interstitial pneumonia, bronchiolitis and emphysema when exposed to intense laser plume for extended periods of time.[7] In

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Current Trends in Extracorporeal Shock Wave Lithotripsy

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Few areas in medicine have undergone as many rapid and dynamic changes as the urological management of upper urinary tract stone disease. Ten years ago, open stone surgery such as pyelolithotomy or ureterolithotomy, was one of the most common urological operations; it is now one of the rarest. Percutaneous stone surgery was introduced in the mid-1980s and rapidly became the most popular form of management of upper urinary tract calculi. In conjunction with this procedure, ureteroscopy continued to progress with improved and innovative technology. Just as many urologists became adept at these techniques, extracorporeal shock wave lithotripsy (ESWL) exploded on the scene. The progressive reduction of invasiveness made this extremely popular with patients and physicians, and more and more urologists have become trained in its use as machines have become more widely available.

When it became apparent that urinary tract calculi could be managed safely and effectively with ESWL, it was only natural that the indications would expand to include other stones such as those within the biliary ducts and gallbladder.

This paper will review the current status of ESWL and its use in the treatment of urinary and biliary tract stones.

BACKGROUND

The first commercially successful and clinically effective and still the most widely available lithotripter is the HM3 Dornier model. Patients undergoing lithotripsy with this machine first have epidural or, less frequently, general anaesthesia established and are then strapped into position on a mobile gantry. The patient is lowered into a tub of water until he is approximately chest deep.

On the bottom of the tub there is a brass semi-ellipse which contains a spark gap electrode. The gap of the electrode is located at the first focal point (F1) of the semi-ellipse. Acoustical shock waves are generated by passing an electrical current across the gap of the electrode. This vaporizes the water in the immediate vicinity and the shock wave propagates circumferentially from this point until it reaches the inner surface of the semi-ellipse, at which point it is focused and redirected up to a point of maximum energy located at the second focal point (F2) of the semi-ellipse. The objective is to move the patient's stone to F2. Positioning is confirmed with bi-planar fluoroscopy and permits the energy to be directed towards the crystal lattice of the stone.

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Attempts are made to fragment the calculus into sand-like particles which can be passed spontaneously, either in the urine or bile. Most patients will have no discomfort during the treatment but some may be aware of a pressure sensation, either posteriorly or anteriorly, as each shock wave enters and leaves the body. Shocks are triggered by the R wave of the electrocardiogram and therefore the rate of treatment is based on the patient's heart rate. An average stone requires approximately 1800 shocks.

Because of clinical safety and commercial success, Dornier and other manufacturers have developed innovative modifications and improvements to this early approach to ESWL (Table I).

TABLE I

ADVANCES IN ESWL TECHNOLOGY

New modalities of shock wave generation
Improved patient-coupling
Less anaesthesia
Better stone imaging

While the spark gap electrode has been well proven, one of its disadvantages is the requirement for frequent replacement of the electrode. This is necessary approximately every 1,200 shocks, because the spark gap becomes larger throughout the treatment and leads to less accurate focusing of energy. Electrode replacement is time consuming and expensive. Attempts to overcome these problems have led to the development of electromagnetic shock wave generators in which an electromagnetic coil receives an electrical discharge; this causes a thin metallic membrane to expand and produce a shock wave which is focused to a secondary point. Piezoelectric systems use piezoceramic crystal transducer elements set in a spherical dish; as each crystal is electrically pulsed by its own separate generator, a shock wave is propagated and focused.

Major nuisances of the original HM3 lithotripter include the large water bath and the inconvenience and occasional difficulty in submerging patients under awkward circumstances. As a result, several manufacturers have improved the patient-coupling mechanism by eliminating the tub and replacing it with water-filled balloons which can be pressed against the patient's back, permitting satisfactory intracorporeal transfer of energy.

Other important advances have been the modification of the original machine and the development of newer ones which reduce the amount of energy generated and the surface area through which the shock wave enters the body. These improvements have led to the reduction and even elimination of anaesthesia in some cases. While this

has been an important benefit to the individual patient in terms of improved comfort and more outpatient procedures, it has led to less success in terms of stone fragmentation and clearance and to increased retreatment rates.[1]

Although bi-planar fluoroscopy has demonstrated its utility in excellent stone imaging, the popularity of dynamic ultrasonography has resulted in the development of machines using this modality to image stones.

With this overview of the current mechanisms of action of the various lithotripters, I would now like to discuss how these modalities are used in the management of urinary and biliary tract calculi.

URINARY TRACT STONES

The original indications for ESWL of upper urinary tract stones were very limited and only included one centimetre stones within the renal pelvis.[2] As reports surfaced which confirmed the efficacy and safety of this treatment, the indications rapidly expanded so that it has become either alone or in combination with percutaneous techniques an integral part of the urological management of most upper urinary tract calculi. The contra-indications to ESWL are few (Table II).

TABLE II

CONTRA-INDICATIONS TO ESWL

Uncorrected coagulopathies
Pregnancy
Obstruction below the stone
Adjacent calcified aneurysm
Patient size/configuration

There has been a tremendous stimulus to define and quantify success rates following treatment of stones with ESWL and it is imperative that readers be aware of the numerous factors which can influence the effectiveness of such treatments so that various series can be adequately compared (Table III).

TABLE III

FACTORS INFLUENCING THE REPORTED EFFECTIVENESS OF ESWL

Stone size
Stone number
Stone composition
Lithotripter model
Time from ESWL
Post-operative imaging technique
Definition of success

In general, it would be anticipated that a single one centimetre calcium oxalate stone within the renal pelvis would have a greater than 90% chance of complete clearance as assessed on a plain radiograph three months post-treatment. As the size of the stone increases to between 2 and 3 centimetres, the stone-free rate will drop to between 50 and 70%.[3] Stones larger than 3 centimetres as well as staghorn calculi, are better managed usually with a percutaneous debulking procedure followed by ESWL to residual fragments.[4]

Stones within the ureter, although often manageable *in situ,* are often pushed back into the kidney or by-passed with a ureteric catheter or stent in anticipation of improved stone visualization and fragmentation. Indwelling ureteric stents are also used liberally for renal stones greater than 2 centimetres in diameter to obviate the likelihood of obstruction by the simultaneous passage of large numbers of stone fragments i.e. steinstrasse.

Although the objective of the treatment is to focus as much energy as possible on the urinary tract calculi, it is inevitable that some of this energy is released to surrounding tissues and this explains the majority of complications and side effects (Table IV).

TABLE IV

COMPLICATIONS OF ESWL

Perirenal hematoma
Pancreatitis
Subcutaneous hemorrhage
Steinstrasse

Overall, ESWL represents a quantum leap in our methodology and strategy for urological management of upper urinary tract stone disease.

BILIARY DUCT CALCULI

Traditionally, biliary duct calculi have been managed by basket extraction through matured T-tube tracts, percutaneous transhepatic tracts and endoscopically placed catheters following endoscopic retrograde choleangiopancreatography (ERCP), and sphincterotomy. However, there remains a group of patients in whom these techniques fail, are technically impossible or unduly hazardous. Because of the success and safety of ESWL in the treatment of upper urinary tract stones, it was a natural trend to utilize these techniques for biliary duct stones. The indications for utilization of ESWL in this location include treatment of stones inappropriate for percutaneous or endoscopic manipulation because of size or underlying anatomical abnormality, and failure of attempts with traditional techniques. If one is using a lithotripter with fluoroscopic visualization it is necessary to image the stones by introducing contrast media through cholecystostomy, transhepatic, nasobiliary or T-tubes because most of these stones are radiolucent.[5]

Stones can be managed safely within the common bile, hepatic and cystic ducts. As the stone size increases, so does the number of shocks and number of treatments required for satisfactory fragmentation. Pre-ESWL endoscopic sphincterotomy is not always necessary and is of no benefit in improving post-operative spontaneous passage of fragments. Both single and multiple stones can be treated successfully.[5] Complications specific to

ESWL of biliary duct ESWL are usually minor (Table V). The overall benefits, particularly to elderly patients, are impressive. ESWL of stones throughout the biliary tree is a safe, effective and invaluable adjunct in the management of these stones.

TABLE V

COMPLICATIONS AFTER ESWL OF BILIARY DUCT STONES

Elevated liver enzymes
Diarrhea
Sepsis
Hemobilia
Pancreatitis

GALLBLADDER GALLSTONES

Upper urinary tract and biliary duct stones are fragmented with ESWL in the anticipation that the majority of the fragments will pass spontaneously. This has presented problems to those with an interest in fragmenting stones in the gallbladder because of the small diameter of the cystic duct and the difficulty of passage of fragments through it. Attempts to overcome these difficulties have led to the utilization of adjuvant bile salts, post-ESWL, to dissolve residual fragments which now have a much greater surface area.

This technique has been used primarily in patients with low volume radiolucent stones in a functioning gallbladder and it is clear that similar to urinary tract and biliary duct stones, those patients with low calculous volume do the best.[6] Side effects are similar to those treated throughout the rest of the biliary tree but there is a higher rate of attacks of biliary pain. Again, this is likely a reflection of the difficulty in the passage of these fragments through the cystic duct and emphasizes the importance of post-operative adjuvant treatment. A serious concern surrounding this management relates to the likelihood of recurrence of gallstones following dissolution of all visible fragments and if these rates are inappropriately high, the competition with laparoscopic cholecystectomy will be lost.

CONCLUSIONS

ESWL is one of the most dramatic advances in medical science to surface from the 1980s. Its technology continues to be refined and the indications and technical factors are becoming more specific. Its usefulness throughout the urinary and biliary tracts has been confirmed and its utilization will continue to increase as it becomes more available. □

References

1. Marberger M, Turk C, and Steinkogler I: Painless piezoelectric extracorporeal lithotripsy. *J Urol* 1988; **139**:695-699.
2. Drach GW, Dretter SP, Fair WR, *et al*: Report of the United States cooperative study of extracorporeal shock wave lithotripsy. *J Urol* 1986; **135**:1127-1133.
3. Norman RW, Brown MG and Awad SA: Influence of size and location of renal calculi on the effectiveness of ESWL. In: Lingeman, J.E. and Newman, D.M. (eds): *Proceedings of the 4th Annual Symposium on Shock Wave Lithotripsy: State of the Art*, 1988. p137-140.
4. Anderson PA, Norman RW, and Awad SA: ESWL experience with large renal calculi. *J Endourol* 1989; **3**:31-36.
5. Norman RW, Fried LA, Lebrun GP, and Taylor MC: Factors influencing the effectiveness of extracorporeal shock wave lithotripsy in biliary duct calculi. *Can J Surg* 1990; **33**:389-393.
6. Sackman M, Pauletzki J, Sauerbuch T, Hall J, Schelling G. and Paumgartner G: The Munich Gallbladder Lithotripsy Study – Results of the First 5 Years with 711 Patients. *Ann Int Med* 1991; **114**:290-296.

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PART 1

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1991, Baggish *et al.* demonstrated the presence of HIV DNA in plume after lasing solutions containing HIV.[8] However, these hazards are very minimal when using careful and continuous smoke evacuation at a high flow rate coupled with sophisticated filtration systems.

With the non-contact lasers, which includes the vast majority in present day use, there is no tactile stimulation. This is a matter of concern to the surgeon, who is generally accustomed to relying on his manual skills. Of course, the contact probe attachment for the Nd:YAG laser overcomes this insecurity, but with non-contact lasers, extra skills must be acquired with special training. □

Editors Note:

Part 2, which examines typical laser applications, will be published in a coming issue.

Bibliography

1. Gorden JP, Zeigler HJ and Townes CH. The MASER- New type of Amplifier, Frequency Standard and Spectrometer. *Physiol Rev* 1955; **99**:1264-1274.
2. Maiman TH. Stimulated Optical Radiation in Ruby. *Nature* 1960; **187**:493-494.
3. Fuller TA. *Surgical Lasers: A Clinical Guide.* New York: Macmillan Publishing Company, 1987.
4. Absten GT and Joffe SN. *Lasers in Medicine: An Introductory Guide.* London: Chapman and Hall, 1989.
5. Fliglny I, Wu JS, Samonte BR and Fried MP. Comparitive Study of Laser and Scalpel Nerve Transections. *Lasers Surg Med* 1992; **12**:43-50.
6. Hurst LC, Badalamente MA and Blum D. Carbon Dioxide Laser Transection of Rat Peripheral Nerves. *Hand Surg* 1984; **9A**:428-433.
7. Baggish MS and Elbakry M. The Effects of Laser Smoke on the Lungs of Rats. *Am J Obstet Gynecol* 1987; **156**:1260-1265.
8. Baggish MS, Poiesz BJ, Joret D, *et al.* Presence of Human Immunodeficiency Virus DNA in Laser Smoke. *Lasers Surg Med* 1991; **11**:197-203.

Arthroscopic Surgery Under Local Anaesthesia

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Arthroscopic surgery of the knee is routinely performed by most orthopaedic surgeons. The advances in instrument technology have markedly decreased morbidity associated with surgery for internal derangement of the knee. Lost time from work and demands on physiotherapy have markedly diminished. Lack of general anaesthetic time, increased demands on recovery room time and, occasionally, patient preference have lead, on occasion, to attempt arthroscopic surgery under local anaesthesia. In order to assess the efficacy and patient acceptability, a pilot program was developed to provide arthroscopic surgery under local anaesthesia at the Camp Hill Medical Centre.

MATERIALS AND METHODS

From January to March 1991, thirty patients with symptoms of internal derangement of the knee were treated by arthroscopy under local anaesthesia. There were 24 male and six female patients with an age range of 17 to 55 years. The range of procedures included those listed in Table I. Each patient was examined one week post-operatively and a questionnaire was completed.

TABLE I

Arthroscopy + examination	17
Arthroscopy + meniscectomy	6
Arthroscopy + resection plica	2
Arthroscopy + arthrotomy	2
Arthroscopy + debridement	3

TECHNIQUE OF ANAESTHESIA

The patient was brought to the operating room suite and an intravenous access line was initiated. A tourniquet was applied to the leg but was not inflated. Twenty-five patients received a small dose of midazolam intravenously for sedation. This was titrated according to the patient's anxiety level. Five patients received no sedation. Oxygen saturation was monitored by means of a pulse oximeter.

Lidocaine, one percent, with 1:100,000 epinephrine solution, was injected into the standard operative portals inferomedially, inferolaterally and superomedially. Care was taken to infiltrate the joint capsule by intra-articular injection initially, followed by injection while withdrawing the needle through the capsule; thus, the subcutaneous tissue and skin were anaesthetized.

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The knee joint was then distended with 60 to 80 ml of bupivacaine 0.25 percent through the previously anaesthetized superomedial portal. At this point, it is necessary to **WAIT FIVE MINUTES** prior to commencing the procedure. During arthroscopy, the knee was continuously irrigated with the routine normal saline irrigation. No anaesthetic solution or Epinephrine was added to the irrigant.

RESULTS

The mean total O.R. time was 56 minutes. The mean surgical time was 37 minutes. The mean recovery room time was 38 minutes. A comparison chart review for 30 arthroscopic procedures, done under general anaesthesia, revealed the mean total operative time was 53.7 minutes, and the mean recovery room time was 70 minutes. The average intravenous dosage of midazolam was 4.6 ml. The mean amount of lidocaine with epinephrine was 19.6 ml. The mean amount of bupivacaine administered intra articularly was 80ml (200 mg).

Twenty-four patients (80 percent) claimed to have no pain during the procedure. Three patients (10 percent) had mild, but bearable pain. Three patients (10 percent) had moderate to severe pain. One of the latter group had an acute patellar dislocation and a capsular tear. The remainder of this group was extremely anxious and quite sensitive to pain.

Two patients with locked knees and large, displaced bucket handle meniscal tears, which proved to be unresectable arthroscopically, underwent mini-arthrotomy. After local infiltration of the planned incisional area, there were no complaints of pain, and meniscectomy was performed in the usual fashion for open meniscectomy.

Post-operatively, 27 patients stated they would undergo the same procedure again and would strongly recommend this technique for someone else requiring arthroscopic surgery to the knee. The remaining three patients who suffered moderate or severe pain would opt for some other form of anaesthesia.

DISCUSSION

Arthroscopic surgery under local anaesthesia is not a new concept. Eriksson, in 1986, reported on its use over a 13-year period.[1] Buckley, in 1989, reported success utilizing an anaesthetic solution of 0.5 percent pilocarpine with 1:200,000 adrenalin.[2] Katz reported on serum levels of bupivacaine after injecting 40 milliliters (100 milligrams) into the knee after general anaesthesia.[3] The peak serum level which occurred at one hour averaged

less than 0.5 micrograms per milliliter. Levels of 3.0 micrograms per milliliter have been associated with clinical toxicity. The clinical toxicity of bupivacaine is manifest by cardiovascular depression or neurological signs. No change in blood pressure or neurological signs were noted during or after surgery in this study.

The recommended dose for local infiltration of bupivacaine is 0.5 to 2 milligram per kilogram of body weight.[3] The average concentration in this study was 2.8 milligram per kilogram for a 70 kilogram person. The knee was evacuated of local anaesthesia during the procedure and continuous irrigation with normal saline was used during surgery with no loss of analgesia. Our current practice has been to use only 40 ml of 0.25 percent bupivacaine with excellent analgesia.

Midazolam is a short acting benzodiazepine used intravenously for short endoscopic procedures.[4] The dosage was individualized and titrated according to the perceived level of patient anxiety. Our current practice is to use no sedation, or very small amounts (1 to 2 milligrams intravenously).

The average total operative time was comparable to a matched control group undergoing the similar procedures under general anaesthesia. The recovery room time, however, was decreased by approximately 50 percent in all cases.

Eighty percent of this small study group would recommend arthroscopic surgery under local anaesthesia. This compares with those figures reported in the literature[1]. Extremely anxious patients or those with capsular knee injuries did not find the procedure acceptable. For future reference, this group would be considered for general or spinal anaesthesia. With these exclusions, however, we now routinely perform arthroscopic surgery under local anaesthesia at patient request, or as an alternative to general or spinal anaesthesia.

CONCLUSIONS

1. Arthroscopy under local anaesthesia is a safe and acceptable technique.
2. Patients with acute capsular knee injuries, or extremely anxious patients, should be excluded.
3. Arthrotomy of the knee may be performed under local anaesthesia, if necessary.
4. Arthroscopic surgery, performed under local anaesthesia, provides a shortened post operative recovery room time. □

References

1. Eriksson E, Haggmark T, Saartok T, Sebik A, Ortengren B. Knee Arthroscopy with local anaesthesia in ambulatory patients. Methods, resutls and patient compliance. *Orthopedics* 1986; **9**:186-8.
2. Buckley JR. Operative arthroscopy under local anaesthetic. *JR Coll Surg Edinb* 1989;**34**:82-7.
3. Katz JA, Kaeding CS, Hill JR, Henthorn TK. The pharmacokinetics of Bupivacaine when injected intra-articularly after knee arthroscopy. *Anesth Analg* 1988; **67**:872-5.
4. *Compendium of Pharmaceuticals and Specialties* 1992; 1237-0.

Ischemic Venous Thrombosis

PHLEGMASIA CERULEA DOLENS – A REVIEW

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***Phlegmasia cerulea dolens* (PCD) is a severe venous disorder characterized by the triad of pain, edema and cyanosis. It results from obstruction of the superficial and deep venous systems and is actually an advanced stage of deep venous thrombosis. However, it is a much more severe form. Usually, it begins as phlegmasia alba dolens (PAD), that is, being localized to the iliofemoral segment and, a few days later, it may propagate distally to occlude the entire venous system.**

Because PCD can result in shock, gangrene, pulmonary embolism or even death, physicians must be aware of its existence, as well as its clinical presentation. Recognition of PCD often occurs too late or not at all, resulting in a potential risk to both life and limb of the patient. At onset it is often mistaken for arterial disease because of its ischemic manifestations. In order to prevent progression of PCD to venous gangrene or possible limb loss, a rapid accurate diagnosis must be made to avoid any delay in management. Current management of PCD includes any one or a combination of the following: 1) anticoagulation with heparin; 2) thrombolysis; or 3) venous thrombectomy. Generally, anti-coagulant or thrombolytic therapy is adequate in PCD; however, if the patient does not respond to this conservative treatment within 6 to 12 hours, or PCD begins to progress to gangrene, thrombectomy is indicated.

Phlegmasia cerulea dolens (PCD), or blue thrombophlebitis, can be defined as "painful blue edema".[1] It is a severe form of peripheral venous thrombosis characterized by sudden severe pain, accompanied by massive edema, and cyanosis of the extremity involved. It develops when there is total or near total venous obstruction of a limb and may result in hypovolemic shock, distal venous gangrene, pulmonary embolism or death.[2] Because it is a venous disorder that threatens both life and limb, a rapid accurate diagnosis is a necessity, which must be followed by prompt management.

PCD is also known as *ischemic venous thrombosis* (IVT)[2] due to its progressive ischemic effects on the extremity. It is because of these ischemic manifestations that the diagnosis of PCD is often mistaken for that of arterial disease. Thus, PCD is often not recognized at presentation. In addition, overall decreased awareness of this clinical entity leads to inadequate recognition.

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The natural history of PCD begins with severe venous hypertension due to the thrombosis, which leads to tissue ischemia. This may or may not ultimately result in venous gangrene.[3] There are three phases in which ischemic venous thrombosis may pass through: 1) phlegmasia alba dolens (PAD); 2) phlegmasia cerulea dolens (PCD); and 3) venous gangrene.[2]

PAD is the more common thrombophlebitis, involving localized thrombosis to the iliofemoral venous segment and presents clinically with pallor and edema of the thrombosed extremity.[4] Once it propagates distally, until the entire deep and superficial venous systems are occluded, it becomes PCD. PAD often appears a few days before PCD, although sometimes it is absent or if present, may go by unnoticed.[2] PCD differs from PAD in that it has a more sudden onsent and severe symptoms. Gangrene usually presents 4 to 8 days after the onset of ischemic manifestations. Its distribution varies, usually presenting on the toes or foot.[3] Occasionally, it will present on the leg or thigh, at which time a greater risk to pulmonary embolism exists.[2]

PATHOPHYSIOLOGY

The initial stimulus in the formation of IVT appears to be a hypercoagulable state which is followed by various pathogenic events. Usually, it is associated with clotting disorders and other abnormal hematological conditions. Predisposing factors are malignancy, trauma, obesity, infection, postoperative and postpartum periods, oral contraceptive use and various life threatening illnesses.[2]

Antithrombin III is an α_2 globulin produced in the liver which is primarily responsible for the inactivation of thrombin. It is also an important cofactor in the generation of heparin's anticoagulant action.[5] Antithrombin III deficiency is an inherited coagulation disorder which requires several precipitating factors, namely surgery, childbirth and infection, before it results in any thrombotic episodes.[2]

Other important coagulation inhibitors are the vitamin K-dependent plasma proteins: protein C and protein S. Protein C inhibits coagulation by inactivating the activated forms of factors V and VIII. Protein S acts as a cofactor of protein C, enhancing its inactivation of factor V.[6] This pathway not only inhibits blood coagulation but also stimulates fibrinolysis. Thus, deficiencies in either protein C or S are often associated with hypercoagulable states which may lead to venous thrombotic events.

Heparin-induced thrombocytopenia may also be a stimulating or complicating factor involved in the pathophysiology of ischemic venous thrombosis. Heparin-

related antibodies are produced and bind to the platelet surface. In this type of thrombocytopenia the platelets aggregate intravascularly and thus platelet-fibrin thrombi may form, leading to a thrombotic event in some patients.[7]

Cyroglobulinemia and polycythemia have also been observed in patients presenting with massive venous thrombosis.[2,3] As well, there has been a reported case of PCD in a woman with the lupus anticoagulant.[8]

Thus patients, with such hypercoagulable clotting disorders and other hematological abnormalities, are at a high risk for the development of PCD. Recognition of an underlying coagulopathy is essential if the proper treatment regimen is to be implemented.

The release of thromboplastic substances from tumors may lead to coagulation abnormalities. Cancer patients often show elevated levels of fibrin/fibrinogen degradation products, thrombocytosis and hyperfibrinogenemia.[11] The levels of certain clotting factors may also be elevated, and as well, a reduction in the levels of antithrombin III is sometimes observed. However, the increased risk of thrombosis in cancer patients may be further increased by surgery, immobilization and chemotherapy.

Due to the presence of a hypercoagulable state, sudden massive thrombosis may occur in the superficial and deep venous systems, resulting in interstitial fluid retention. This is manifested by massive edema and a considerable increase in tissue pressure. Up to 3 to 5 L of fluid can be trapped in the extra-vascular compartment of the swollen extremity, leading to a marked decrease in blood volume and hypovolemic shock.[2] It has also been suggested that arteries adjacent to the occluded veins undergo spasms; however, further study is required before the presence of definite arteriospasm can be confirmed in PCD.

The cyanosis typically seen in PCD develops due to the capillary venous stasis associated with the venous occlusion. The increased venous hydrostatic pressure tracks back through the capillary bed to the arterial vasculature.

The fluid loss that occurs leads to hypotension. This decreased arterial pressure combined with the increased interstitial tissue pressure are greater than the arterial critical closing pressure, resulting in collapse of the arterial wall and tissue ischemia.

From here, the progression of the disease is related to the size of the obstruction. If there is an incomplete blockage the potentially reversible condition, PCD, occurs; if there is total obstruction, irreversible venous gangrene results.

Thus, if PCD is permitted to progress, serious complications can occur. Pulmonary embolism can result when thrombi become dislodged from vessel walls. Postphlebitic syndrome occurs as a sequelae to a deep venous thrombosis, characterized by edema, pain, stasis dermatitis, cellulitis and varicose veins. The end result of such a syndrome is ultimately ulceration which may lead to local gangrene.[4]

CLINICAL MANIFESTATIONS

Although some PCD cases do involve the upper extremity, most affect the lower extremity. In addition, 75 percent of cases localized to the iliofemoral segment occur in the left limb. This may be explained by the compression of the left iliac vein by the right iliac artery. The classical presentation of PCD is severe pain, cyanosis and edema of the involved extremity. The edema is characteristically hard, woody or rubbery and is not always present initially. In addition, cutaneous blebs or bullae may develop a few days later.[2]

DIAGNOSIS

At onset, the manifestations of PCD strongly resemble those of arterial disease or a combination of both arterial and venous disorders. Because the management is entirely different in each case, it is important to make a rapid accurate diagnosis.

When PCD is first suspected, noninvasive doppler ultrasound is often performed. It gives a rapid reliable diagnosis and involves a relatively simple approach. This technique has been previously described.[9]

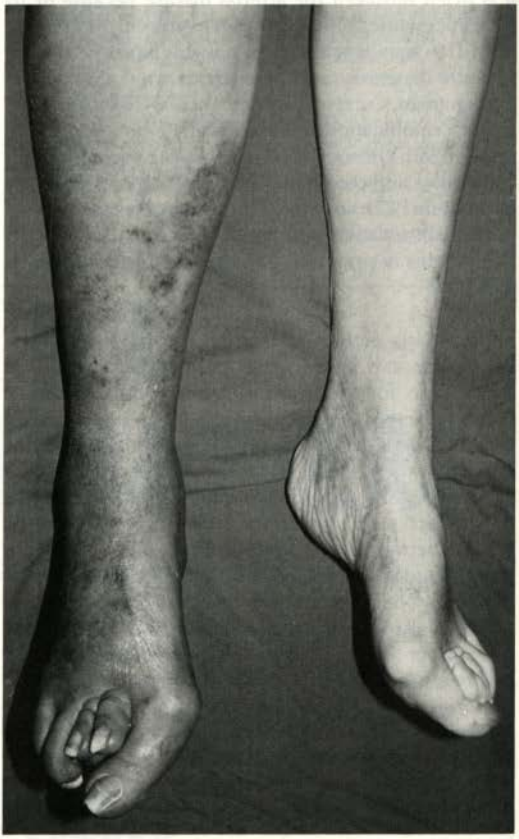

Figure 1

Severe venous gangrene of the right leg with clear demarcation, and severe edema on a patient with advanced carcinomatosis.

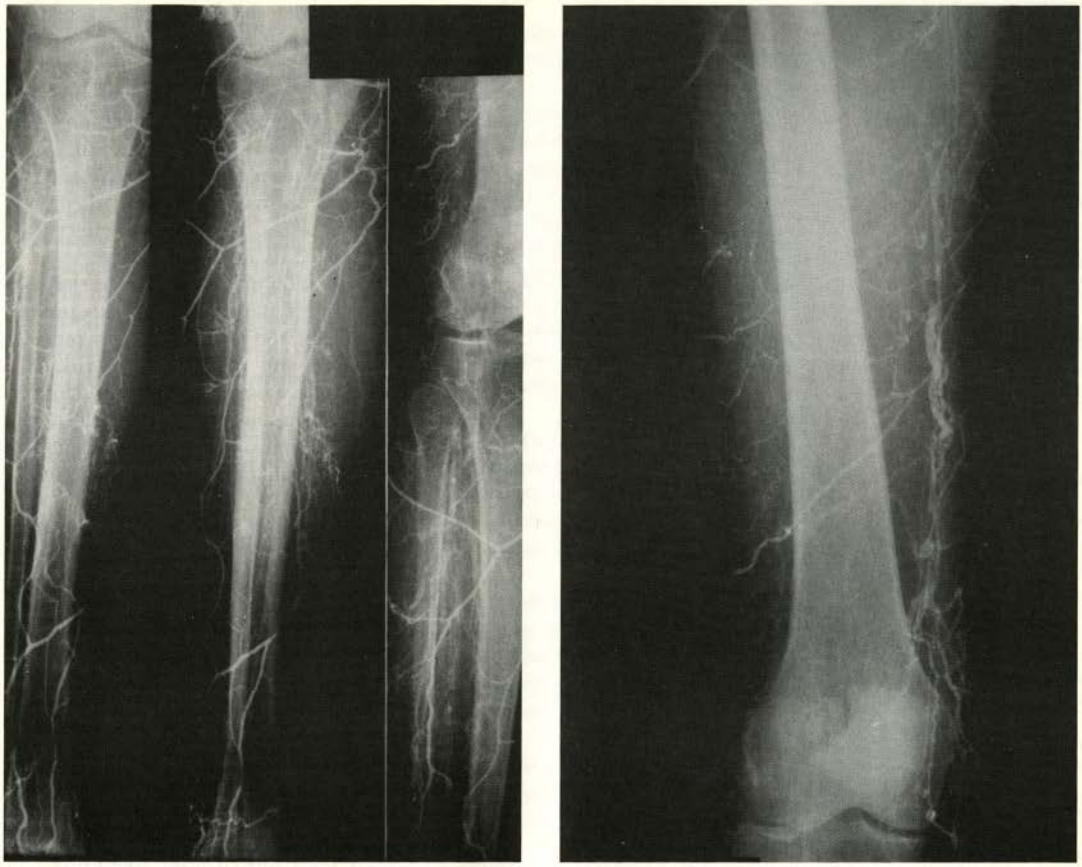

Figure 2-3

Leg venogram on patient in Fig. 1 showing absence of filling of deep and major superficial veins with only a few patent tributaries.

Both extremities are tested using the asymptomatic leg as a normal control. Assessment of venous signals is performed in the common femoral, popliteal and posterior tibial veins,[9] and several criteria are necessary before a diagnosis can be made.[10] In PCD the normal spontaneous flow is absent, and as well, the normal flow phasicity associated with respiration also disappears. There is, however, a considerable increase of flow in the superficial saphenous system, which can be detected as high-pitched continuous signals, eradicated by slight compression with the doppler probe.[10] The normal velocity increases associated with distal limb compression are diminished or absent in deep vein thrombosis. Furthermore, if proximal limb compression results in reverse flow or reflux, valvular damage is suspected, possibly associated with a previous DVT. In addition, in severely cyanotic and edematous legs, doppler ultrasound can often detect arterial pulsation, thus ruling out arterial obstruction as a cause.

Plethysmography is also a simple procedure requiring minimal cooperation from the patient. It is frequently used in conjunction with doppler ultrasound, improving the accuracy of diagnosis. Cuffs are placed around both thighs and a series of inflations and deflations of the cuffs follows. Venous capacitance (VC) is measured during inflation and venous outflow (VO) is measured during deflation. The VO/VC measurement is calculated and plotted on a graph to see if it is within the "normal" range. An obstructing thrombus in a proximal vein will cause reductions in venous capacitance and outflow, thus altering electrical impedance as well as volume and rate of venous outflow.

Thus, combination of doppler ultrasound and plethysmography are the preferable methods of diagnosis of PCD.

It is important to note that if both doppler and plethysmography are negative and DVT is still suspected, venography should be done next. Alone, it is the most accurate diagnostic test but is often reserved for difficult diagnoses that can not be determined by noninvasive procedures.

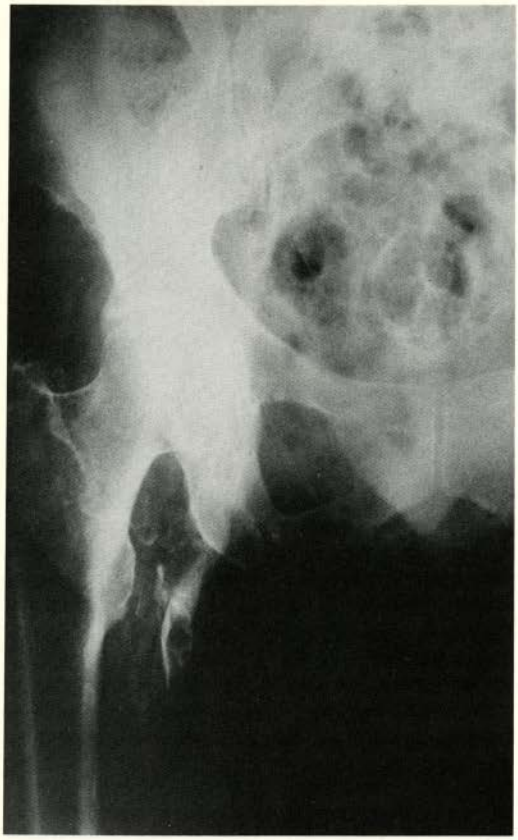

Figure 4

Large iliofemoral vein thrombus on same patient. Only minimal amount of dye is visible in the lower portion of the I.V.C.

MANAGEMENT

The main objective is the management of PCD is arresting the propagation of the thrombi and thus reducing venous hypertension and preventing the progression to venous gangrene. The management of PCD includes a myriad of treatment modalities including both medical and surgical management. Nowadays, the most common choices for PCD treatment include any one or a combination of 1) heparinization, 2) thrombolysis, or in more severe cases where anti-coagulant and thrombolytic therapy have failed, 3) surgical venous thrombectomy.[3] As one would expect, the further the disease has been allowed to progress, the more dramatic and radical the treatment.

Elevation of the extremity is necessary to allow blood to return and to relieve venous engorgement. This is an effective measure in relieving venous stasis because, although most venous channels are blocked, some do remain patent, allowing venous return and the reduction of acute symptoms.

In the case of hypovolemic shock or circulatory collapse, fluid and cell replacements are required immediately. Whole blood, plasma or packed red cells should be administered. If packed red cells or whole blood is not available, a plasma expander such as Dextran can be used. Low molecular Dextran has effective anti-coagulant properties in that it reduces platelet adhesiveness and aggregation. However, one must use caution when using Dextran as its use may be associated with side effects such as overloading, anaphylaxis and renal damage.[2]

Systemic anticoagulation with heparin is the standard therapy for PCD. Its primary function is to prevent propagation of the clot and thus secondarily prevents pulmonary embolism and minimizes the risk of a postphlebitic syndrome. Long-term anticoagulation is maintained with Warfarin, and patients are usually fitted with elastic stockings to control the associated edema.[7,10] Anticoagulation is contraindicated, however, in severe acute trauma patients.

Another common form of therapy in PCD includes fibrinolytic therapy with Streptokinase, or more commonly, Urokinase. These agents actively dissolve the clot. Fibrinolysis is reserved for patients who fail to respond to heparin therapy and is contraindicated in trauma, pregnancy or postpartum periods, arterial hypertension, streptococcal infection, surgical wounds[2] and bleeding conditions such as recent stroke or past peptic ulcer disease.[10] A few side effects have also been reported, such as allergic reactions, pulmonary emboli, fever, malaise and severe hemorrhage, especially in the brain. However, more research in thrombolytic therapy alone, or in combination with surgical procedures is necessary before a definite conclusion can be made regarding its use.

A few rarer forms of medical management include vasodilators, hot packs and sympatholytics which relieve the angiospasm and venous engorgement believed to be associated with PCD.

Finally, it is very important to treat the underlying disease or coagulopathy. Often, if the patient's underlying condition is managed, the PCD resulting from it may be avoided. Certain circumstances require surgical intervention.

The most common surgical procedure for IVT is venous thrombectomy which involves removal of the actual thrombus. The use of thrombectomy is limited, but it has been reserved for specific cases of PCD. Such cases include those complicated by severe ischemia or impending gangrene, as well as cases where no response to heparin is observed within 6 to 12 hours of its administration.[3] Other indications for venous thrombectomy include patients with recurrent pulmonary emboli, floating progressive thrombosis.[2] In addition to patients with severe PCD, Rutherford also recommends thrombectomy for active healthy patients presenting with acute PAC (within 3 days).[4] Thrombi are best removed if they are fresh (24-48 hours) and thus venous thrombectomy may have some use in treating the early stages of venous gangrene. However, after 3 or

4 days, thrombi adhere to vessel walls and their complete removal is almost impossible. There are few venous thrombectomies performed beyond seven days.[4]

Venous thrombectomy has met with varied success, depending on the patient's status. While it has resulted in the prevention of thrombotic progression and postphlebitic syndrome, the removal of the source of pulmonary embolism and the relief of venous and compression hypertension in some patients[2,3], other patients have experienced rethrombosis after surgery. The more wide-spread the thrombosis, the less likely the thrombectomy will maintain patency and preserve valve function. This includes distal thrombi. Venous thrombectomy is not performed on thrombi distal to the popliteal vein.[4]

Because anticoagulation is contraindicated in acute trauma patients, a Greenfield filter can be inserted prior to venous thrombectomy, to protect against the migration or detachment of a thrombus during surgery. It may prevent pulmonary embolism postoperatively, at which time anticoagulation is still contraindicated.[11]

An inferior vena cava interruption is rarely performed alone, but it too may be indicated following a thrombectomy to prevent further pulmonary embolism. If the presence of pulmonary embolism is suspected, plication is the inferior vena cava may be required post-thrombectomy.

Compartment syndrome manifests an increased subcutaneous subfascial edema. Fasciotomy may return arterial circulation to normal which removes the threat of loss of tissue function and viability.

Although radical, the final treatment option is amputation and is usually used in life-threatening situations, such as advanced venous gangrene, which all other treatment regimens have failed.

Thus, therapeutic interventions are chosen based on the progression of the PCD. Generally, uncomplicated PCD responds better to bed rest, extremity elevation and heparinization. If no response to this management occurs within 6 to 12 hours, venous thrombectomy should be performed. PCD complicated by severe ischemia or early gangrene should also be managed by thrombectomy. The use of conservative heparin therapy is inadequate in treating venous gangrene.

CONCLUSION

Ultimately, the prognosis of PCD patients depends on the presence or absence of systemic derminants such as severe shock, pulmonary embolism and underlying disease. The most common cause of immediate death in PCD are underlying disease, often neoplasms, and fatal pulmonary emboli. Circulatory collapse, although often present, can often be reversed if treated in time. This emphasizes again the importance of early recognition and prompt treatment of PCD in avoiding such fatal complications. Equally important, is the management of the underlying disease in preventing predisposition to PCD.

Perhaps the most predictable factor in determining the outcome of PCD patients is the presence or absence of gangrene, as well as the extent of it. Mortality rates have been shown to be higher in individuals whose PCD has progressed to venous gangrene.[2] As with nongangrenous PCD, the outcome of patients with gangrene is affected by the presence or absence of the systemic factor already mentioned. The prognosis is also worsened by the presence of associated infection. Even at this stage, prompt treatment can improve the prognosis of both the life and limb of the patient.

PCD must be recognized at onset if serious limb threatening sequelae and life-threatening complications are to be avoided. □

References

1. Chalmers N, Campbell I. phlegmasia cerulea dolens revisited. *Practitioner,* 1987; **231**:1519-1521.
2. Haimovici H. Ischemic venous thrombosis: Phlegmasia cerulea dolens and venous gangrene, in Haimovici H. *Vascular Surgery: principles and techniques* (3rd ed.) Norwalk, Connecticut: Appleton and Lange, 1989. 954-970.
3. Weaver FA, Meacham PW, Adkins RB, Dean RH. Phlegmasia cerulea dolens: therapeutic conserderations. *South Med J* 1988; **81**:306-312.
4. Rutherford RB. The role of thrombectomy in the management of iliofemoral venous thrombosis, in Rutherford RB. *Vascular Surgery* (3rd ed.) Philadelphia: WB Saunders Co., 1989. 1569-1574.
5. Cohen DJ, Briggs R, Head HD, Ache CW. Phlegmasia cerulea dolens and its association with hypercoagulable states: case reports. *Angiology* 1989; **40**:498-508.
6. Clouse LH, Comp PC. The regulation of hemostasis: The protein C. system. *N Engl J Med* 1986; **314**:1298-1304.
7. Berkow R, Fletcher AJ, Chir B, editors. *The Merck Manual of diagnosis and therapy.* Rahway, New Jersey: Merck and Co., Inc., 1987. 1160.
8. Baethge BA, Payne DK. Phlegmasia cerulea dolens associated with the lupus anticoagulant. *West J Med* 1991; **154**:211-213.
9. Bellefontaine R, Del Campo C. Non-invasive evaluation of the vascular patient. *N S Med J* 1988; **67**:25-28.
10. Hill SL, Martin D, McDannald ER Jr, Donato AT. Early diagnosis of iliofemoral venous thrombosis by doppler examination. *Am J Surg* 1988; **156**:11-15.
11. Wilson B, Hawkins ML, Mansberger AR Jr. Post-traumatic phlegmasia cerulea dolens: an indication for the Greenfield filter. *South Med J* 1989; **82**:780-782.

Patterns of Use of an Urban Transportation System for the Disabled

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Transportation is an important component of independent living, providing access to educational, vocational, cultural, recreational and commercial facilities in the community. Whether disabled people are handicapped depends upon the physical and social environment. The following results span five years of an urban transportation system for the disabled. Monthly ridership increased from an average of 1,151 trips per month in the first year to 4,025 trips per month in year five. Although the absolute numbers of non-ambulatory riders increased, the relative percentage of the total trips decreased from 67.2% to 43.9%. The total number of trips for work, avocation, education and medical treatment all increased over the five years. The relative percentage of medical visits decreased over the five years. Musculoskeletal pain was the most common diagnostic category (22.4%), followed by cerebrovascular accidents (19.3%). Age distribution was bimodal with peaks in the third and eighth decades. The large elderly population registered and the increases in ambulant passengers suggest a need for continued growth.

Transportation barriers impose a significant handicap for disabled individuals. Transportation is an important component of independent living[1], providing access to education, vocational, cultural, recreational and commercial facilities in the community. The magnitude of the disabled population is estimated to be 7 to 10 percent of the world population.[2] *All Change*, a consumer study of public transport handicap in the greater London (England) area estimated that seven percent of Londoners are transport handicapped in their use of public transport.[3] Twenty percent of these transport handicapped people lived alone without access to a car. In a study of the prevalence of the locomotor disability and handicap in the Cape Peninsula, 30 percent of locomotor handicapped people used no transportation at all.[4] Although cost was one limitation, two-thirds of the subjects in that study felt limited by the distance from public transport and the inability to get on and off.

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There will always be people with disability but the extent of handicap is largely related to the physical and social environment. In the Framingham Disability Study, homemaking and transportation were the areas with the highest prevalence of unmet needs.[5] Without decreasing the disability, the handicap can be reduced by changing the environment.[6] In this light the role of public transportation for the disabled is evolving.[7] Diversified approaches include the training of the mentally disabled for the purpose of independence in the use of current public transportation.[8] Recognition and study of those services presently in use and means of improvement is underway.[7,9-13] Realization that removing the barrier involves more than improving the vehicle, has led to alternate approaches such as establishment of funds to alter automobiles for use by disabled drivers, making accessible buses exempt from sales tax, directing more federal transportation funds to disabled persons and ensuring government consultation with disabled consumers.[13]

Present systems use the dial-a-ride concept, whereby consumers book transportation over the telephone.[1,7,9,10,14] Public transport systems in the future may allow greater integration of the disabled into the fixed route, mainstream system.

Reports are available describing the effect of transportation on independent living, some patterns of use, and the need for public transportation of the disabled. However, we have not found information regarding the types of disability involved or the changes and adjustments which occur as a public system grows. The object of this study was to determine the nature of the users and pattern of use of an urban transportation system for the disabled. This demographic data will prove useful in planning new systems and adaptions to the present system.

METHODS

Files from the Halifax Metro Transit Commission Access-A-Bus System (an urban public transportation system for the disabled), covering the period of January 1981 until December 1985, were reviewed. From the 1367 available files, we determined the age, cause of disability of the users of a public transportation system for the disabled, ambulant versus non-ambulant status, trip frequency and destination. This system design was introduced to supplement an already existing fixed-route public bus system.

Seven buses were used, including one Orion-2 with a capacity of 6 wheelchair or 13 ambulatory riders, three modified with 4 wheelchair and 6 ambulatory riders, and three modified with 5 wheelchair and 12 ambulatory riders. Two types of service were available. Subscription service was used for regular work or education destinations and non-subscription service required advance booking, or if on demand, was limited by the space available. A priority system for users of the Access-A-Bus system had been established with the inception of the system due to the restricted capacity in its beginning years.[10] In descending order the priorities were: trips to work and for educational purposes; wheelchair users who could not transfer from their wheelchair to a car; wheelchair users who could transfer from their wheelchair to a car; wheelchair users who could transfer to a car; permanent registrants with a continuing disability; and temporary registrants.

Statistical Analysis

We analyzed changes in the demographic data over time using Student's t test with three degrees of freedom. We defined statistical significance as $p < 0.05$[1].

RESULTS

Monthly ridership increased from an average of 1,151 trips per month in 1981 to 4,025 trips per month in 1985 ($p < 0.005$) (Fig. 1).

The percentage of non-ambulatory users decreased over the five years from 67.2% to 43.9% ($p < 0.02$), although the absolute numbers rose, indicating an increase in the percentage of ambulatory users as the systems capacity expanded (Fig. 2).

Destinations of work, education, medical visits and avocational visits were also compared with time (Fig. 3). In the area served, children were transported to and from school by a means other than the public transport system, and are therefore not included in the education destination.

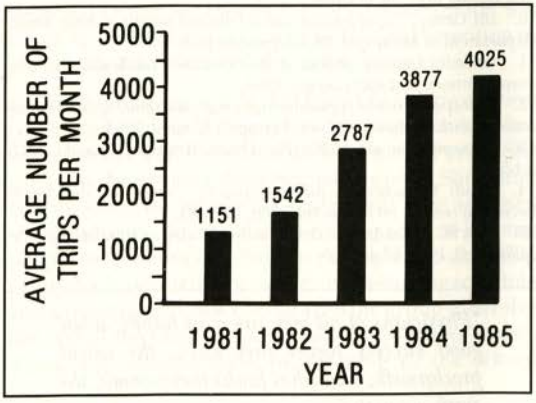

Figure 1

Average number of trips per month.

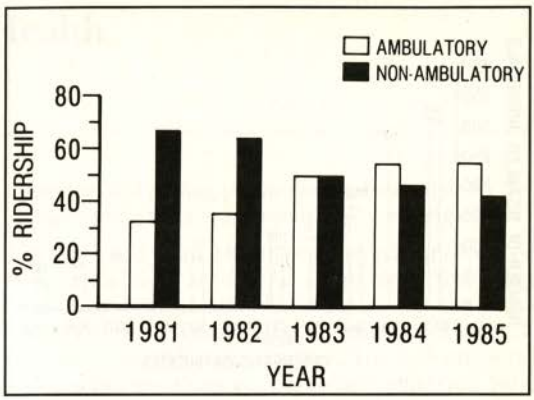

Figure 2

Percentage of ridership in the ambulatory and nonambulatory categories.

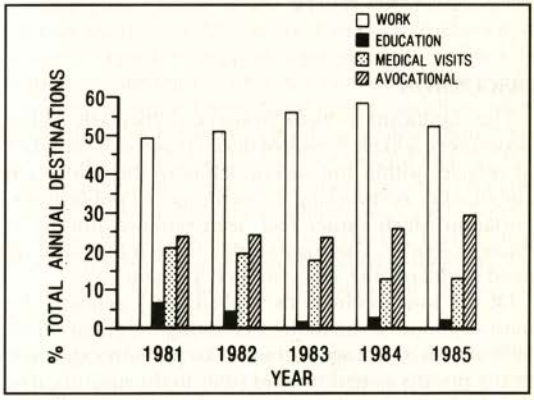

Figure 3

Destinations of users of this system.

Although, the number of work trips within the system increased with time ($p < 0.005$), the overall percentage of work trips per month did not change ($p < 0.10$). Avocational visits also increased significantly in number ($p < 0.005$) but not in percentage ($p < 0.10$). The percentage of medical visits ($p < 0.005$) significantly decreased over the five years ($p < 0.005$). There was no significant change in the number or percentage of educational trips ($p < 0.10$).

The disabling conditions of users of this system are illustrated in Figure 4. The category "other" at 3.5% included those disabilities which could not be categorized in the listed categories and those disabilities which were inadequately described during the registration process.

A bimodal distribution of ages within the system was found, with 55% of the registrants between the ages of 60-90, and peaks in the third and eighth decade.

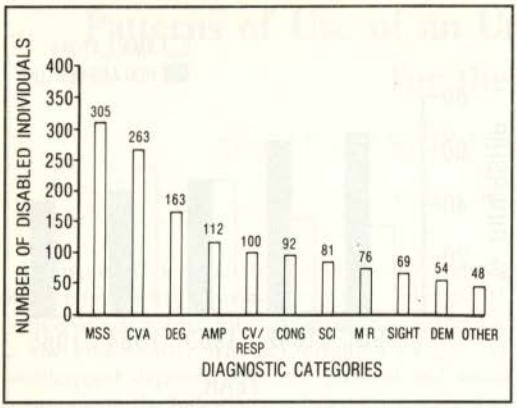

Figure 4

Number of individuals in each diagnostic category, including musculoskeletal (MSS), cerebrovascular disease (CVA), degenerative neurological diseases (DEG), amputations (AMP), cardiovascular and respiratory disease (CV/RESP), congenital (CONG), spinal cord injury (SCI), mental retardation (MR), visual impairment (SIGHT), dementia (DEM) and OTHERS.

DISCUSSION

The significant increase in users, particularly ambulatory users, is likely a result of the increase in the number of vehicles within the system, allowing those who are ambulant or nonworking to obtain special public transportation which earlier had been rationed due to its limited capacity. This suggests that there is a continuing need for increasing access to such a system.

Of the four destinations studied, work remains the most common destination, accounting for greater than 50% of trips. Once again, this can be partially explained by the priority system. Studies prior to the institution of this system predicted work as a major destination.[10] The data indicate a significant number of disabled people are able to continue vocational independence. This is in contrast to other systems which have been mandated on regular bookings as they do not have the resources to commit.[14] Recreation and shopping were the significant distractions of the London system because of the lack of regular bookings.

Twenty-two percent of the users had listed musculoskeletal pain as their disability. The average age of users who had joint pain and other musculoskeletal problems was 71.7 years. This is in keeping with the overall peaks of registration within the older population group. In a similar dial-a-ride system in London, England 61 percent were over the age of 60 years.[14]

As stated in the Canada Health Survey,[11] and as we found in this study, a large portion of the population requiring special public transportation are in the 60 to 90 year age group. In the Canada Health Survey of 1983/84,[11] estimated requirements for the disabled in Canada were that 27.4% of the 2,448,000 Canadians who were disabled required public transportation, and 21.2% (142,000) of those requiring public transportation had special transportation needs.

Although the categories used in this study were broad due to the lack of detail in some files, this was also the case reported in the Canada Health Survey of 1983/84.[11]

Increases in the number of ambulant passengers as the service increased its capacity and the large elderly population registered, suggest a need for a continued increase in service. Recognition of the increasing elderly population with the concomitants of chronic illness and disability infer an increasing need for public transportation.[5,15] Increasing the transportation available would also provide opportunities for continued independent living, allowing access to areas outside of work and educational pursuits. □

ACKNOWLEDGEMENTS

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References

1. DeJong G. Independent living: From social movement to analytic paradigm. *Arch Phys Med Rehabil* 1979; **60**:435-446.
2. Hermanova HM. Need for a data base on consequences of diseases. *Int Rehabil Med* 1985; **7**:61-63.
3. Doyle C. Transport handicap – its causes, its scale and its effect. *Int Disabil Stu* 1988; **10**:84-85.
4. Disler PB, Jacka E, Sayed AR, Rip MR, Hurford S, Collins P. The prevalence of locomotor disability and handicap in the Cape Peninsula. Part I. The coloured population of Bishop Lavis. *S Afr Med J* 1986; **69**:349-352.
5. Branch LG, Jette AM. The Framingham Disability Study: I. Social disability among the aging. *Am J Public Health*, 1981;**71**:1202-1210.
6. World Health Organization. *International classification of impairments, disabilities and handicaps: a manual of classification relating to the consequences of disease.* Geneva: World Health Organization 1980.
7. Roberts E. Dial-a-ride round Europe. *Int Disabil Stud* 1987; **9**:83-85.
8. Marchetti AG, Cecil CE, Graves J, Marchetti DC. Public transportation instruction: Comparison of classroom instruction, community instruction and facility-grounds instruction. *Mental Retardation* 1984; **22**:128-136.
9. Bowe FG. Transportation: A key to independent living. *Arch Phys Med Rehabil* 1979; **60**:483-486.
10. IBI Group. *Transportation needs of disabled persons in Nova Scotia.* Department of Municipal Affairs, January 1979.
11. Statistics Canada. *Reports of the Canadian Health and Disability Survey.* Ottawa: Statistics Canada, 1985.
12. Transport Canada. *A guide to recognizing, understanding and assisting travellers with disabilities.* Ottawa: Transport Canada, 1983.
13. Transport Canada. *Mobility Plus.* Ottawa: Transport Canada. 1987; 1:1-5.
14. Booth TJ. Accessible public transport – when will the dream become a reality? *Int Disabil Stu*, 1988; **10**:81-83.
15. Zola IK. Toward the necessary universalizing of adisability policy. *Millbank Q*, 1989; **67**:401-428.

"Physicians of all men are most happy; what good success soever they have, the world proclaimeth, and what faults they commit, the earth covereth."

Francis Quarles (1592-1644)

Current Topics in Community Health

Authors: Christiane Poulin,* MD, MSc, FRCPC and
David Elliott,** MD

TOP C.O.P.S.

HEALTH PROMOTION VS DISEASE PREVENTION – A CASE OF MISTAKEN IDENTITY

In July 1992, the Dalhousie Medical School launched the *C*ase *O*riented *P*roblem *S*timulated (C.O.P.S.) curriculum. This teaching approach challenges students to learn by researching, as individuals and in tutorial groups, problems given them in case scenarios. Their efforts frequently generate a volume of raw facts which must then be channelled into a useable framework through group discussion and interaction with a tutor.

The title is a wordplay on the TV show "TOP COPS", an example of the new genre of "reality programming" which presents dramatic reenactments of true life stories. The following is our rendition of a C.O.P.S. dialogue between rookie and veteran about two public health concepts that are often hard to tell apart!

Rookie: It's all a pile of rhetoric! You say Health Promotion is different from Disease Prevention. It seems to me if we are preventing disease we must be promoting health. What's the difference?

Top Cop: First of all, do you know a definition of the term 'health promotion', say, one of the classical definitions?

Rookie: That's easy - Health promotion is the process of enabling people to increase control over, and to improve, their health.

Top Cop: OK. That's the definition adopted by the World Health Organization in 1984 when a programme in Health Promotion was first established in the WHO Regional Office for Europe.[1] This same definition was reiterated in the Ottawa Charter of Health Promotion in 1986.[2] What do you think the definition means?

Rookie: It might sound trite, but I think health promotion is helping people help themselves. My great-grandmother was a teacher and the mayor's wife in a small town. She used to tell me stories about helping the poor. She found charity wasn't the answer because people were ashamed to take charity. So, she started finding ways of helping people help themselves. She once told me about a group of pupils who wanted to organize a book-sharing schedule and a reading club. She encouraged the group to involve the rest of the children in her one-room school house. Then, she assisted them by speaking to the school inspector, and getting permission and materials for the children to fix the storage room into a reading corner.

Top Cop: Good point. Health promotion in one form or another has been around for a long time. Your story about your great-grandmother is a good one. Let's start with her students. The *community* of students identified a problem—they did a *needs assessment.* The students found a good solution—sharing books and a reading club. Your great-grandmother merely *enabled* them to improve their opportunities for literacy by *mediating* and *advocating* for them (speaking to the inspector). Tell me more about your great-grandmother's tactics.

Rookie: Well, later, she and a few other teachers in nearby schools and some mothers worked together to get a reading club rotating in the schools of the region, on Sunday afternoons. After years of work by teachers and womens' organizations, a lot of people in the community started supporting the idea of a community library. In addition to undertaking fund-raising activities, they presented their case for funding to the municipal government. My great-grandfather was still mayor, and apparently he had other ideas about priorities for the community. Anyway, finally, a library was built. To me, that's health promotion, because if the kids had a better chance at literacy, then maybe they would get better jobs, better food, better housing and eventually, this would translate into better health.

Top Cop: Part of the difficulty understanding the concept of health promotion is the terminology which is different among the various health professions, and which has been evolving. Can you elaborate a bit more on what your great-grandmother did, but using the language of the Ottawa Charter?

Rookie: Well, I suppose she helped *create a supportive environment,* supportive of education and literacy, by negotiating for school space and by helping parents recognize the value of literacy. Also, the students, parents, and teachers participated in the decision-making and were empowered through *strengthening community action.* Certainly learning to read is *developing personal skills.*

Top Cop: I'm curious. Your great-grandmother wasn't a nurse or doctor—her efforts were not medical and the health impacts are not immediately obvious. She contributed to literacy in her community. In her day, her ideas on literacy and community development were novel (no pun intended!). But you said better jobs, food and housing would eventually translate into better health, and therefore her activities are properly called health promotion. What is health? Why is what she did health promotion and not disease prevention?

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Rookie: The WHO definition is "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".[2] I think my great-grandmother was simply trying to improve her students' lot in life. Ah, I see what you mean. She was acting on some of the pre-requisites for health such as education, sustainable resources, social justice and equity.[2] Plus, she was working with others to create networks and to change the social environment. She wasn't trying to prevent a specific disease, nor did she use a preventive manoeuvre such as those reviewed by the Canadian Task Force on the Periodic Health Examination. To me, disease prevention is something health professionals do to patients—like providing health education about high-risk lifestyles, or doing a Pap smear.

Top Cop: OK. Your great-grandmother wasn't trying to reduce the likelihood that an individual would get a disease (primary prevention); or, trying to interrupt a disease process before the individual became symptomatic (secondary prevention); or, trying to reduce disability in an individual with symptomatic disease (tertiary prevention). I agree, her goal was not risk reduction, whereas risk reduction is the basis of most preventive programs.

Rookie: Wait! I've seen lots of TV advertising aimed at risk factors and changing people's lifestyles—like quitting smoking and becoming physically active. The ads don't refer to a specific pathology. Certainly, Luba (Break Free!) and the Tortoise and the Hare (Participaction) don't fit a medical model which one would expect in clinical prevention. I think advertising about lifestyles is definitely health promotion. Yet you just said risk reduction is primary prevention.

Top Cop: The television advertisement Break Free! does act on a risk factor. However it does so by means of a health promotion intervention targeting a population instead of a prevention manoeuvre such as counselling focused on an individual in a clinical setting. Can you describe how Break Free! works?

Rookie: It uses social marketing. Adolescents are encouraged to reject smoking because smoking isn't "cool". The campaign uses a group of teenagers led by the popstar Luba as role models with the message, "You can have fun and be cool without smoking". It tries to make the social norm of *not* smoking appealing to the target population. I get it—acting on a risk factor can be either primary prevention or health promotion.

Top Cop: Yes. However, there is yet another dimension of health promotion which causes confusion. It stems from a philosophical debate: Should health promotion be focused on individual behaviour or broader institutional and social conditions? In the United States, the *Healthy People, the Surgeon General's Report on Health Promotion and Disease Prevention* (1979) set the stage for a focus on individuals' behaviour, with the individual being seen as having ultimate responsibility for his health status.[3,4] The concern with this approach is that lifestyle is not entirely determined by personal choice, and that those suffering most from morbidity and mortality related to lifestyle are the least likely to be able to alter their behaviour, given their circumstances. At the other extreme of "victim-blaming" is "system-blaming", where health promotion strategies would call for a broad program of environmental and social policies and controls.

Rookie: I think we should try to balance our approach between individual and population-directed health promotion. For example, Heart Health projects put some of their resources on individuals' smoking behaviour, for both prevention of the onset of smoking and for smoking cessation. However, there is also healthy public policy on a national scale in that the federal government passed legislation banning the advertisement of tobacco products. The two approaches to health promotion balance the individuals' freedom of choice with the public good.

Top Cop: You can see that health promotion and disease prevention are complementary approaches, with the main difference between them being one of focus. I like your word "balance"—balance between health promotion and disease prevention; balance between health promotion focused on the individual and on the population. But health promotion is complex—it combines many methods, involves an ill-defined notion called community, and the time scales are longer. For health promotion to be effective, the tactics must be cohesive, which requires 1) a needs assessment; 2) clear goals and objectives; 3) an array of health promotion strategies; 4) an implementation plan; 5) evaluation; and finally 6) action on the problems identified in the evaluation. Community participation is essential.

Rookie: Who is the community and what is community participation?

Top Cop: Next time—you tell me! □

References

1. World Health Organization. Regional Office for Europe. Working Group on the Concepts and Principles of Health Promotion. Health Promotion. A discussion document on the concept and principles. Copenhagen, 9-13 July 1984. *Public Health Rep* 1986; **14**:245-5.
2. World Health Organization. Ottawa Charter for Health Promotion. International Conference on Health Promotion, Ottawa, Canada. November 17-21, 1986.
3. Stachtchenko S, Jenicek M. Conceptual differences between prevention and health promotion: Research implications for community health programs. *Can J Public Health* 1990; **81**:53-8.
4. Green LW, Kreuter MW. Health promotion as a public health strategy for the 1990s. *Ann Rev Public Health* 1990; **11**:319-34.

"I have never had a policy. I have simply tried to do what seemed best each day, as each day came."

Abraham Lincoln (1809-1865)

Personal Perspective

AN INTERDISCIPLINARY APPROACH TO MANAGEMENT OF CHRONIC PAIN

By: Charles Gregory,* MD, Vancouver, B.C.

Pain is our greatest problem, largely because it involves every aspect of our lives. In other words, it is not simply a matter of input of nociceptive information from the body; it is a total experience. Yet although this is generally accepted, the management of pain, especially chronic pain, does not reflect this understanding.

The pain experience includes awareness of the origin of the nociceptive information; the degree of accompanying disability; implications for both the immediate future (I'll feel much happier when this fracture has been reduced and I have a cast on) and the longer term (my God I'm never going to walk again); the possible involvement of others (my husband/wife will have to stop work and look after me, so who's going to earn the money), and the impact on social activity (we shan't be able to take the kids to their Xmas party). Thus a significant source of nociception will impact profoundly, perhaps devastatingly, on every part of one's life, physical, mental, emotional spiritual and social.

Should the problem be dealt with quickly and effectively, resolution of the injury/illness occurs and most of the factors will be resolved automatically, expeditiously. Thus acute injury/illness causing pain does not usually cause severe ongoing psycho-social consequences. However, if resolution does not occur and the problem becomes chronic, a totally different picture emerges. All the secondary factors persist and as time passes with no significant improvement in the pathology, these secondary factors become increasingly intense, along with a corresponding rise in the level of psychophysiological stress responses. These in turn cause further exacerbation of the pain, largely through secondary effects on the musculo-skeletal system, which then reciprocally augments the secondary factors, and so on ....

Eventually the secondary factors and the stress responses become so disruptive that they may turn out to be even more destructive to the person than the original injury. Steady deterioration in the general physical condition follows, with progressive doubts about ever being employable again; financial problems beset the patient; family difficulties are not far behind even where relationships were good; self image becomes progressively eroded; and depression is endemic in this large group of people with suicide not unknown. The consequences are potentially catastrophic, both personally and socially.

It is crystal clear that management of such a devastating, all encompassing process is well beyond the capacity of any single professional of whatever discipline and however well qualified. Yet the rule, rather than the exception, is to attempt to do just that, with the inevitable consequences for the long suffering patient. The only sensible solution is referral to an interdisciplinary centre specifically created to teach self-management of all aspects of the problem for in the long run, successful restoration of hope and a reasonable life can only be created by the person concerned and, without the appropriate instruction, this is well-nigh impossible. □

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"Human beings never welcome the news that something they have long cherished is untrue; they almost always reply to that news by reviling its promulgator."

(H)enry (L)ouis Mencken (1880-1956)

Medical Humanities

T. J. Murray,* OC, MD, FRCPC

Halifax, N.S.

"For the general practitioner a well-used library is one of the few correctives of the premature senility which is so apt to overtake him. Self-centered, self-taught, he lives a solitary life, and unless his everyday experience is controlled by careful reading or by the attrition of a medical society it soon ceases to be of the slightest value and becomes a mere accretion of isolated facts, without correlation. It is astonishing with how little reading a doctor can practice medicine, but it is not astonishing how badly he may do it."

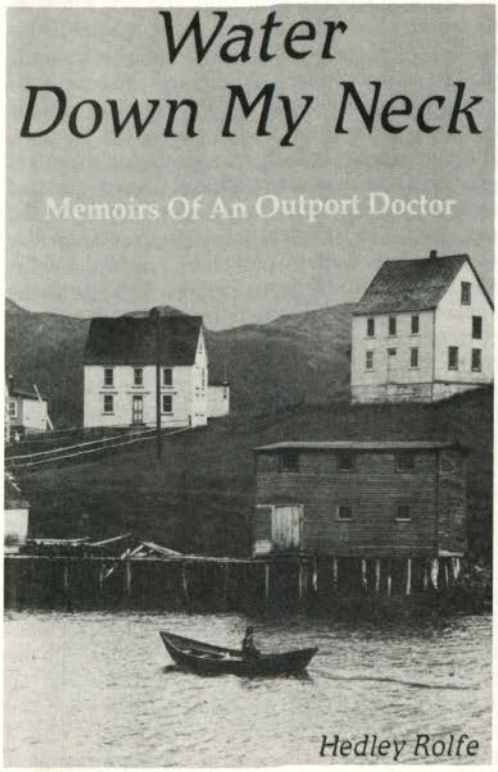
Sir William Osler
Books and Men, 1901

WATER DOWN MY NECK

A good friend of mine, a sophisticated Englishman with impeccable education and world experience, moved many years ago to Newfoundland which he loves. He is at one moment a dignified consultant with a world reputation, and the next moment a Newfoundlander fishing with his own salmon flies from a Gander boat and later sipping his home-made beer and swapping stories. In my all too infrequent trips to Newfoundland I have admired his adaptation to the life of Newfoundland, and have learned respect for the beauty and hardness of living there. I have come to believe that the severe and beautiful life in Newfoundland creates the character of its people.

Another physician, who moved from England to Newfoundland and who adapted to Newfoundland life there, was Dr. Hedley Rolfe, a family physician who took on the responsibilities of a district physician. In his new book, *Water Down My Neck*, published by Breakwater Press, 1992, he writes a series of essays on his experience there. Without any prior knowledge or experience, he soon began to learn from the fisherman and join them on the waves. Although always an amateur in comparison, you can sense his joy and pride in sharing some of their activities as well as caring for their ills.

He writes warm and sensitive stories, and anecdotes of fishermen and their strong wives, terrible accidents accepted as part of the life on treacherous northern waters, "house calls" for emergencies by way of sled through storms, and adventures with nets and traps from small boats. He openly sheds tears when a father brings him his drowned son wrapped in a red canvas sail. He doesn't say it in so many words, but he loves these people, and he feels privileged for his life there with them.



One amusing incident occurred when he decided it would be fun to refurbish an old cannon and fire it at the time of each wedding in the community. He describes the adventure and the first firing as a lark, but is clearly proud of his place in the community, and his minor reputation for eccentric actions that made the locals scratch their heads. He acquired two more old cannons so that they could fire a 21 gun salute when the Lieutenant Governor sailed into their outport. He was able to wash off the gunpowder soot in time to greet the Royal representative at the local hospital.

Acting as district officer for a large area, often not serviced by roads, and often in mid-winter storms and heavy seas, is a daunting challenge. Dr. Rolfe is up to the challenge and savours the old style doctors' approach to answering the call of his patients. He decries the age of physicians who do not make house calls and is proud of the relationship that he had with his patients.

His stories are amusing and entertaining and he captures the feeling of the Newfoundlander and the Newfoundland experience. He does not overdo the attempt to capture the Newfoundland accent, but that

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comes through, and his writing style is clear and only occasionally overstated. I was pleasantly surprised at how much I enjoyed reading these stories. He does not boast or gloat, but just tells a nice story, a touching event or an amusing vignette.

Like so many of the hard working physicians of the Newfoundland outports of years ago, he later moved on, westward to act as the public health physician for northern Manitoba. In retirement he has moved further west, to a more pacific island off the coast of British Columbia, still a proud owner of a Newfoundland trapskiff.

MEDICINE'S GREAT JOURNEY

Because the history of medicine in the 20th century is equated in the minds of most people, and certainly in the minds of most physicians, with change and advance and "miracles" and "breakthroughs", many of the books on the progression of modern medicine are self-congratulatory and technology centered.

A book that shows people suffering with illness, the triumphs and limitations of medicine and medical science, and the joys and frustrations of practice, through the eye of a camera, is *Medicine's Great Journey*. (Toronto: Little Brown and Co. 1992. $62.00.) I like this book because it shows not only the dramatic advances in surgery, technology, vaccines and drugs, but also the dignity of the hardworking family doc, visiting the old woman in her home, and dealing with the tragedy of people with chronic diseases that we care for as we await the day when there may be more effective treatment.

Our professional past is revealed in photographs from the last 100 years and they include many we have seen before, and many more that are new to our eyes. Some are familiar from other photo essays and collections, books and the Life Magazine photo essays of years past, but others are new images to us, selected from archives and museums in ten countries.

Ernest Ceriani, a country doctor in Kremmling, Colo., became an American folk hero in 1948 after a magazine photo essay captured the drama of his daily life.

I have always admired the teaching and writings of Robert Coles of Harvard, who uses William Carlos Williams and Walker Percy to encourage students to think about important issues in medicine. He says in his introduction to this book that when he was a resident in 1955, walking among the puffing iron lungs during one of the last big polio epidemics, his mentor Williams told him to take "a photo or two; it will all pass; it will all be gone by the time you are my age." He also meant that it was important to remember this when it had passed. "The past matters more than we realize," Williams once said, "We walk on its ground, and if we don't know the soil, we're lost." This book captures that past.

A photographer and editor brought together the collection from ten countries, and Richard Flaste, a Pulitzer Prize winning science writer, did the text. It's a book that will be around for a long time, and it's worth dropping hints to your friends and family about this book prior to your next birthday. Physicians will enjoy this, but it also provides others with a glimpse of that great journey that is medicine.

THE DOCTOR STORIES OF WILLIAM CARLOS WILLIAMS

William Carlos Williams is well known as a poet but less well known as Doc Williams, the general practitioner and obstetrician of suburban Rutherford, New Jersey. At the end of his career he was acknowledged as one of the world's great and influential modern poets, but he was still in his office each day, delivering babies, and making house calls. He was also a great story teller and Dr. Robert Coles collected his stories about the experience of doctoring in a volume, *The Doctor Stories* (William Carlos Williams, New Directions Publishing, 1984).

As I mentioned above, Coles uses the stories in his Harvard medical teaching, as the sensitive, touching and blunt stories cover many important issues that students should think about. Coles says, "He gives us a chance to discuss the alcoholic doctor, the suicidal doctor. He prompts us to examine our ambitions, our motives, our aspirations, our purposes, our worrying lapses, our grave errors, our overall worth. He gives us permission to bare our souls, to be candidly introspective, but not least, to smile at ourselves, to be grateful for the continuing opportunity we have to make recompense for our failure of omission or commission."

Doc Williams would refuse requests to speak to physician groups and conferences, shyly saying he had little to say to his colleagues. His stories, however, speak volumes.

DR. CONDOM'S SHEATH

Fallopius in *De Morbo Gallico*, published in 1564, described the condom as a protection against syphilis and was regarded as the inventor of this important advance in preventive medicine. He wasn't, of course,

as various penile coverings were known to the Egyptians and many earlier societies, just not to Western Europe in the 16th century. It was also said that a certain Dr. Condom, claiming to be the inventor, introduced this device to Charles II, who was concerned with the number of Royal bastards. The grateful king knighted him for his cleverness. This has not been verified, but it has been repeated in the nicely produced volume, *The Illustrated Treasury of Medical Curiosa*, (Art Newman, Toronto: McGraw-Hill Book Company, 1988)

This book has hundreds of brief anecdotes, but they are more for commuter or cottage reading than serious historical study. The book is nicely designed and printed, but the cutsey historical snippets are in the tradition of newspaper fillers. It's fun but the items all cry out for more information and depth. It would not have taken much more space or time, as they seem to have done their reading and research, and would have made this a book to be respected in your collection, rather than destined after some time to the local charity book sale.

BIOGRAPHY - HISTORICAL RECORD OR ANCESTOR WORSHIP?

Historians differ on the various methods of recording history and particularly the history of a subject like medicine. There is a long tradition of recording the actions of great persons and the drama of great events, but this has been replaced in recent years by the record of social movements and of ideas. Despite this trend there are still a lot of books appearing that tell us of Lister, Osler, or the moderns Koop and Pauling.

To demonstrate that biography is not a dead version of medical history, in 1993 the Royal Society of Medicine will begin a new publication called the *Journal of Medical Biography*. It will have categories of papers on physicians (Osler, Babinski), surgeons (Hutchingson, Cushing), investigators (Florey, Castellani), hospitals (Bart's, Mayo Clinic), and the great moments in medicine (Lister and carbolic acid, Banting and insulin), as one might expect, but also on "truants" like the great cricketer Dr. W. G. Grace, patients like Frederick Delius and John F. Kennedy, and a section on the great medical history collections.

At a meeting in London recently I spoke to Dr. Hugh L'Etang who will edit the section on patients in medical history, and he is very positive about the high standards planned for the journal.

The first of the quarterly issues will be available in February 1993. For information, write the Royal Society of Medicine Services Ltd., 1 Wimpole Street, London, W1M 8AE.

ROYAL SOCIETY OF MEDICINE

While on the topic of the RSM, I was able to spend time in their new quarters and use the library on my two month London visit this fall. For the last twenty five years I have used their library for some of my research, as they have one of the best medical libraries in the world. They have taken over and refurbished the large post office building next door on Wimpole Street, and the new facilities are comfortable and attractive. Perhaps the architect could have used less light wood and pink in the decor, as the entrance and conservatory area has the appearance of a department store. The RSM always had that note of dignity imparted by dark mahogany and wrought iron, still found when you make your way through the new areas, and into the old library section with its desks, large periodical section and overhanging walkways. That has not changed.

If you are not a member, consider an overseas membership. It allows you to use their facilities when in London, including the library, restaurant and bar, and the new Domus Medicus, with comfortable and well-appointed rooms and suites just off Oxford Circus. The various sections of the Society have evenings of papers and symposia, and I usually attend at least one evening when in London as they are uniformly excellent.

THOMAS WILLIS AND THE CASTLE

One unusual place where you can stay on your next visit to England is in the house of Thomas Willis, "The Castle", 12 Farm Lane, Little Bedwyn, Wiltshire UK. SN8 3LU. The owner Major William Bacon and his wife Dawn are warm hosts who are very attentive to visitors to the 400 year old cottage where Willis was born, and provide you a cozy room and big English breakfast.

While there you could read the new biography, *Thomas Willis 1621-1675: His life and Work.* (J. Trevor Hughes. 1992). Hughes indicates that among all the contributions of Willis, and there were many, he was the first neurologist and neuropathologist (Willis coined the term "neurology" for the study of the nervous system).

I remember reading about "The Castle" many years ago in a paper by Dr. William Feindel, who also edited a magnificent fascimile edition of Willis' great work, which was illustrated by Sir Christopher Wren. Bill Feindel, a Willis expert, was the successor to Penfield at the Montreal Neurological Institute and is now the Chancellor of Acadia University.

HAUNTING BOOK SHOPS

There are great finds in the bookshops of Halifax, and I have found the booksellers to be very knowledgeable and attentive. They will get you anything in print, and the second hand booksellers will scour the country for older books. *John Doull, Bookseller,* recently found me some historic books in Kentville, and in Toronto. *Schooner Books* will do the same, and these booksellers have connections all across the country, and beyond. I have found some good Nova Scotiana at *Back Pages.*

For current books on the medical humanities I have found *Frog Hollow* excellent, and Mary Jo Anderson has agreed to create a shelf on the Medical Humanities, so have a look the next time you are in. In future columns I will indicate some of the newer volumes appearing on the shelf. □

An Appreciation

DR. JOHN SHAW

Those who admired John Shaw (and there were many) were devastated by news of his death. A colleague saddened by his death summed up the feelings of many people who knew him when he said "He was the best family doctor I have ever known."

Born in Montreal, John received his medical degree from Dalhousie Medical School in 1975. He was a dedicated family physician who practised with the Northwest Medical Group. Very early in his medical career with the group, he earned the reputation of being an outstanding family doctor. His patients invariably spoke in effusive terms of his compassion, commitment and his medical competence.

When his patients learned of Dr. Shaw's serious illness, many people took the time to write to him to express their gratitude for his wonderful care. One patient, another physician, wrote "Dear John. It is in times like this, as a family doctor and with the illness of one's own family doctor, that we realize our own and our family's vulnerability when we as doctors contract some of the illnesses we treat. I chose you as my personal physician and that of my family, because you exemplify what I consider to be the qualities of a good family physician. You have always been knowledgeable and compassionate to those you have served so well."

Another patient wrote about a horrendous episode in her life that left her family shattered but which also demonstrated Dr. Shaw's caring personality and his extraordinary sensitivity.

In the woman's own words, "We remember well a tragic time in our lives when our dear son was born and died within hours of his delivery. Although we still grieve our loss, we have always felt extremely fortunate to have had you for a doctor. I remember when I arrived at the Grace how each nurse would ask, 'Who is your doctor?' When I would reply Dr. John Shaw, each and every nurse would answer, 'You are very lucky. He is a wonderful doctor.' And how true their words were. Our son's death was such a terrible shock but it was made somehow more bearable because you stayed with us for several long hours, answering our questions, and providing us with comfort and professional guidance."

Dr. Shaw's patients seemed to agree that they were, indeed, very fortunate to have him for a doctor. In particular, youngsters thought he was a terrific fellow. Without question, he had a special affinity for young children and teenagers. He also had infinite patience and possessed the invaluable capacity of being able to offer comfort and guidance when it was most needed.

Blessed with a curious mind, intrigued by nature, in constant pursuit of knowledge, he particularly enjoyed sharing fascinating information with medical students. He was a gifted communicator and understood that it was very important to find the time to make sure his patients understood all of the essential aspects of their medical problems and the treatment he prescribed.

Dr. Kempton Hayes, who worked closely with him for many years, says his friend and colleague was a brilliant man who loved to teach but who never talked down to anybody.

No doubt, Dr. Hayes felt very honoured when he was asked to eulogize John Shaw's life. In his moving eulogy, he described his friend as being "a master of both the art and science of medicine" and a man who greatly cherished his wife and children. It was a remarkable achievement.

There is little doubt, that John Shaw was an exceptional physician and a superb human being who has left behind a legacy of cherished memories. □

Excerpts from the eulogy given by Dr. Kempton Hayes.
(Editing Dorothy Grant)

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MSNS POLICY SUMMARY

(Approved by MSNS General Council, November 1991)

GENERAL PRACTITIONER SPECIALIST REFERRALS

The Requirements Of A General Practitioner Making A Referral

The minimum requirements for general practitioner referral where relevant to include:

1. History of the present complaint, including previous medical history, symptoms, and clinical findings;
2. Reports of investigations including, where possible, original X-Ray films, electrocardiograms, etc.;
3. Treatments used and their effectiveness;
4. Whether or not treatment is being requested;
5. Whether this is a primary consultation or consultation for a second opinion; and
6. The degree of urgency for the consultation.

The Response Required From A Specialist

The minimum requirements for consultation reports where relevant to include:

1. An overview of the presenting complaint;
2. Clinical assessment;
3. Interpretation of investigations;
4. Conclusions reached so far;
5. Recommendations for management including those for further investigations where necessary, follow-up arrangements, and treatment; and
6. A note of what treatment has been instituted.

A specialist's consultation report should be initiated within a reasonable time, three working days would seem to be appropriate.

Secondary Referral

Specialists should be prepared to justify secondary referral in at least one of the following criteria:

1. Clinical necessity for accurate diagnosis;
2. There is demonstrable urgency relating to the patient's condition; and
3. Geographic considerations – somewhat vague, however many areas of our province are under-serviced with respect to some specialties and diagnostic facilities, should the need for some consultation or investigation seem appropriate then we recommend that the opportunity not be denied.

once daily

Nasacort*

(Triamcinolone Acetonide Nasal Inhaler)

THERAPEUTIC CLASSIFICATION

Corticosteroid for nasal use

ACTIONS AND CLINICAL PHARMACOLOGY: Triamcinolone acetonide is a potent anti-inflammatory steroid with strong topical and weak systemic activity. When administered intranasally in therapeutic doses, it has a direct anti-inflammatory action on the nasal mucosa, the mechanism of which is not yet completely defined. The minute amount absorbed in therapeutic doses has not been shown to exert any apparent clinical systemic effects.

INDICATIONS AND CLINICAL USE: Nasacort™ (triamcinolone acetonide) nasal inhaler is indicated for the topical treatment of the symptoms of perennial and seasonal allergic rhinitis unresponsive to conventional treatment.

CONTRAINDICATIONS: Active or quiescent tuberculosis or untreated fungal, bacterial and viral infection. Hypersensitivity to any of the ingredients of Nasacort™ (triamcinolone acetonide).

WARNINGS: In patients previously on prolonged periods or high doses of systemic steroids, the replacement with a topical corticosteroid can be accompanied by symptoms of withdrawal, e.g. joint and/or muscular pain, lassitude, and depression; in severe cases, adrenal insufficiency may occur, necessitating the temporary resumption of systemic steroid therapy. Careful attention must be given to patients with asthma or other clinical conditions in whom a rapid decrease in systemic steroids may cause a severe exacerbation of their symptoms.

Pregnancy: See Precautions.

PRECAUTIONS:

1) The replacement of a systemic steroid with Nasacort™ (triamcinolone acetonide) has to be gradual and carefully supervised by the physician. The guidelines under "Administration" should be followed in all such cases.
2) During long-term therapy pituitary-adrenal function and hematological status should be assessed.
3) Patients should be informed that the full effect of Nasacort™ therapy is not achieved until 2 to 3 days of treatment have been completed. Treatment of seasonal rhinitis should, if possible, start before the exposure to allergens.
4) Treatment with Nasacort™ should not be stopped abruptly but tapered off gradually.
5) Corticosteroids may mask some signs of infection and new infections may appear. A decreased resistance to localized infections has been observed during corticosteroid therapy; this may require treatment with appropriate therapy or stopping the administration of Nasacort™.
6) The long term effects of Nasacort™ are still unknown, in particular, its local effects; the possibility of atrophic rhinitis and/or pharyngeal candidiasis should be kept in mind.
7) There is an enhanced effect of corticosteroids on patients with hypothyroidism and in those with cirrhosis. Acetylsalicylic acid should be used cautiously in conjunction with corticosteroids in hypothrombinemia.
8) Because of the inhibitory effect of corticosteroids on wound healing, in patients who have had recent nasal surgery or trauma, a nasal corticosteroid should be used with caution until healing has occurred.
9) Patients should be advised to inform subsequent physicians of prior use of corticosteroids.
10) Until greater clinical experience has been gained, the continuous, long-term treatment of children under age 12 is not recommended.
11) **Pregnancy:** The safety of Nasacort™ in pregnancy has not been established. If used, the expected benefits should be weighed against the potential hazard to the fetus, particularly during the first trimester of pregnancy.
Like other glucocorticosteroids, triamcinolone acetonide is teratogenic to rodents and nonhuman primates (see under TOXICOLOGY). The relevance of these findings to humans has not yet been established. Infants born of mothers who have received substantial doses of glucocorticosteroids during pregnancy should be carefully observed for hypoadrenalism.
12) **Lactation:** Glucocorticosteroids are secreted in human milk. It is not known whether triamcinolone acetonide would be secreted in human milk, but it is suspected to be likely. The use of [illegible] possible benefits of the drug be weighed against the potential hazards to the infant.
13) **Children:** Nasacort™ is not presently recommended for children younger than 12 years of age due to limited clinical data in this age group.
14) Fluorocarbon propellants may be hazardous if they are deliberately abused. Inhalation of high concentrations of aerosol sprays has brought about cardiovascular toxic effects and even death, especially under conditions of hypoxia. Aerosols are safe when used properly and with adequate ventilation, but excessive use should be avoided.
15) To ensure the proper dosage and administration of the drug, the patient should be instructed by a physician or other health professional in the use of Nasacort™ (see Patient Instructions).

ADVERSE REACTIONS: Adverse reactions reported in both controlled and uncontrolled studies involving 1148 patients who received Nasacort™ (triamcinolone acetonide) are provided in the following table:

Adverse Experience	Nasacort % (n = 1077)	Placebo % (n = 545)
Headache	20.4	19.4
Upper Respiratory Infection	5.3	8.1
Nasal Irritation	5.1	4.2
Throat Discomfort	4.6	3.3
Dry Mucous Membranes	3.5	2.2
Epistaxis	4.6	6.6
Sneezing	3.1	5.5
Sinusitis	2.1	3.7

When patients are transferred to Nasacort™ from a systemic steroid, allergic conditions such as asthma or exzema may be unmasked (see Warnings).

SYMPTOMS AND TREATMENT OF OVERDOSAGE: Like any other nasally administered corticosteroid, acute overdosing is unlikely in view of the total amount of active ingredient present. However when used chronically in excessive doses or in conjunction with other corticosteroid formulations, systemic corticosteroid effects such as hypercorticism and adrenal suppression may appear. If such changes recur, the dosage of Nasacort™ (triamcinolone acetonide) should be discontinued slowly consistent with accepted procedures for discontinuation of chronic steroid therapy. (see Administration). The restoration of hypothalamic-pituitary axis may be slow; during periods of pronounced physical stress (i.e. severe infections, trauma, surgery) a supplement with systemic steroids may be advisable.

DOSAGE AND ADMINISTRATION: See Warnings.

Nasacort™ (triamcinolone acetonide) is not recommended for children under 12 years of age.

Careful attention must be given to patients previously treated for prolonged periods with systemic corticosteroids when transferred to Nasacort™. Initially, Nasacort™ and the systemic corticosteroid must be given concomitantly, while the dose of the latter is gradually decreased. The usual rate of withdrawal of the systemic steroid is the equivalent of 2.5 mg of prednisone every four days if the patient is under close supervision. If continuous supervision is not feasible, the withdrawal of the systemic steroid should be slower, approximately 2.5 mg of prednisone (or equivalent) every ten days. If withdrawal symptoms appear, the previous dose of the systemic steroid should be resumed for a week before further decrease is attempted.

The therapeutic effects of corticosteroids, unlike those of decongestants, are not immediate. Since the effect of Nasacort™ depends on its regular use, patients must be instructed to take the nasal inhalations at regular intervals and not as with other nasal sprays, as they feel necessary.

In the presence of excessive nasal mucus secretion or edema of the nasal mucosa, the drug may fail to reach the site of action. In such cases it is advisable to use a nasal vasoconstrictor for two to three days prior to Nasacort™ therapy. Patients should be instructed on the correct method of use, which is to blow the nose, then insert the nozzle firmly into the nostril, compress the opposite nostril and actuate the spray while inspiring through the nose, with the mouth closed.

An improvement of symptoms usually becomes apparent within a few days after the start of therapy. However, symptomatic relief may not occur in some patients for as long as two weeks. Nasacort™ should not be continued beyond three weeks in the absence of significant symptomatic improvement.

Adults and Children 12 years of age and older: The recommended starting dose of Nasacort™ is 400 μg per day given as two sprays (100 μg/spray) in each nostril once a day. If needed, the dose may be increased to 800 μg per day (100 μg/spray) either as once a day dosage or divided up to four times a day, i.e., twice a day (two sprays/nostril), or four times a day (one spray/nostril).

After the desired effect is obtained, patients may be maintained on a dose of one spray (100 μg) in each nostril once a day (total daily dose: 200 μg per day).

AVAILABILITY: Nasacort™ (triamcinolone acetonide) is a metered-dose aerosol unit containing a microcrystalline suspension of triamcinolone acetonide in the propellant dichlorodifluoromethane and dehydrated alcohol USP 0.7% w/w. Each canister contains 15 mg triamcinolone acetonide. Each actuation releases approximately 100 μg triamcinolone acetonide of which approximately 55 μg are delivered from the nasal actuator to the patient (estimated from in-vitro testing). There are at least 100 actuations in one Nasacort™ canister. The device should not be used after 100 inhalations, since the amount delivered thereafter per actuation may not be consistent. It is supplied with a nasal adapter and patient instructions: Box of one.

REFERENCES:

1. Product Monograph: NASACORT (triamcinolone acetonide); Rhone-Poulenc Rorer, 1992. 2. Ziemniak J.A. J. Resp. Diseases, 1991; 12(3A): S41-S45. 3. Storms W.W. et al., Annals of Allergy, 1990; 66 : 329-334. 4. Tinkelman D. et al., Annals of Allergy, 1990; 64 (February Part II): 234-240. 5. Spector S. et al., Annals of Allergy, 1990; 64: 300-305. 6. Data on File: Rhone-Poulenc Rorer; 5029-02. 7. Data on File: Rhone-Poulenc Rorer; 5029-01.

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