
THE COMBINED SERVICES PLASTIC SURGERY SOCIETY

Second Annual Meeting and Dinner. Fort Block House 6 and 7 October 2005

In response to rising numbers, and increasing geographical dispersal of Serving plastic surgeons, trainees and career SHOs, the Combined Services Plastic Surgery Society was inaugurated on 6 October 2004. The second annual meeting was held on 6 and 7 October 2005 at Fort Blackhouse, and was combined with a dinner in the Blue Room of the Officers' Mess. A total of 25 Serving and Retired Officers attended an afternoon of presentations prior to the dinner, and the following morning was used for career interviews. The meeting attracted 8 CPD points.

The Defence Consultant Adviser in Burns and

Plastic Surgery, Wing Commander Godwin Scerri FRCS(Eng) FRCS(Plast) RAF presided. The principal guest was Surgeon Commander Charles Chapman OStJ OBE FRCS, Royal Navy, retired from the active list, who gave a talk on his experiences in Operation Grapple. We were delighted also to host Dr Rex Laurie, formerly Register with the 4th Maxillofacial Unit during the North Africa Campaign, and Mr Mark Henley FRCS, Civilian Consultant Adviser in Plastic Surgery to MDG(N). The meeting Secretary was Surgeon Commander Rory Rickard FRCS(Ed) Royal Navy. Selected abstracts are presented below.

The Ex-vivo effect of Zoledronic Acid on Melanoma

JJ Smith, I Cree

TORC Laboratories, Queen Alexandra Hospital, Portsmouth

Introduction

Bisphosphonates have been shown to have anti-tumour effects through inhibition of the mevalonate pathway. The Adenosine Triphosphate-based tumour chemosensitivity assay (ATP-TCA) can be used to measure the effects of cytotoxic agents against human tumour-derived cells. This work studied the activity of Zoledronic acid against cells derived from metastatic cutaneous melanoma and five melanoma cell lines.

Methods

SKMEL 2, SKMEL 5, SKMEL 28, SKMEL 31 and A375 cells, as well as tumour-derived cells from 20 tumour samples were exposed to Zoledronic acid within the ATP-TCA.

Results

All 5 cell lines showed sensitivity to Zoledronic acid. Tumour-derived cells showed considerable heterogeneity of sensitivity to Zoledronic acid.

Conclusions

Metastatic melanoma shows sensitivity to Zoledronic acid. Identifying the characteristics of the sensitive tumours will enable optimisation of its clinical use.

Inhibition of Malignant Melanoma In-Vivo by a Novel Isoform of Vascular Endothelial Growth Factor

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¹Department of Plastic Surgery, Countess of Chester Hospital,

²Microvascular Research Laboratories, University of Bristol

Introduction

Vascular Endothelial Growth Factor (VEGF) is necessary for blood vessel growth in tumours and as such is essential for tumour growth and survival. The recent discovery of the anti-angiogenic, inhibitory isoform of VEGF (VEGF165b) offers a potential therapy for melanoma.

Different splicing of the VEGF gene results in mRNA expression of either pro-angiogenic (e.g. VEGF165), or anti-angiogenic isoforms (e.g. VEGF165b). VEGF165b has been shown to inhibit angiogenesis in physiological models. Cancer biology presents a challenging environment in which to investigate the potential of this inhibitory protein in an in-vivo tumour model of melanoma

Methods

The effect of expression of these isoforms by tumours on their growth was measured. 1x10⁶ A375 human amelanotic melanoma cells, stably transfected with VEGF165 or VEGF165b cDNA, or a mixture of the two VEGF expressing cell lines were injected subcutaneously into the dorsum between the scapulae of nude mice (n=6 per group). VEGF165 and VEGF165b protein expression by the cell lines was confirmed by ELISA. Tumour width (w) and length (l) were measured every 3 days. Tumour volume was calculated as $w.l.[(w+l)/2]$. After 28 days, or when tumours reached 16mm diameter, the tumours were harvested and subjected to H&E staining to assess percentage necrosis and immunohistochemistry to evaluate vessel density.

Area necrosis was calculated using EclipseNet image analysis software.

Results

After 20 days mean \pm SEM VEGF165b-expressing tumour volumes (mm^3) were significantly less (450 ± 158) than either VEGF165-expressing (2842 ± 895) or combined cell tumours (1298 ± 415 , $p < 0.001$, two way ANOVA). Mean \pm SEM doubling-time of VEGF165-expressing tumours was 1.64 ± 0.15 days, significantly less than VEGF165b-expressing tumours (2.84 ± 0.4 days, $p < 0.05$). The combined cell population mean doubling-time was 2.04 ± 0.26 days.

Hence tumour growth rate and size are reduced under the influence of VEGF165b.

There was significantly more necrosis in tumours transfected with the anti-angiogenic VEGF165b ($14.3\% \pm 7.4$) when compared to pro-angiogenic VEGF165-expressing tumours ($0.05\% \pm 0.05$) $p < 0.05$. PECAM immunohistochemical staining for endothelial cells revealed a paradoxical increase in vessel density in VEGF165b-expressing tumours.

Conclusion

These results are consistent with the principle that inhibiting proximal splicing and switching isoform expression from VEGF165 to VEGF 165b may be an effective therapy for cancer.

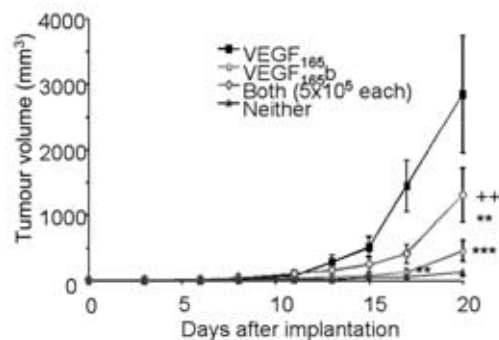


Fig 1. Tumour volume plotted against days following injection.

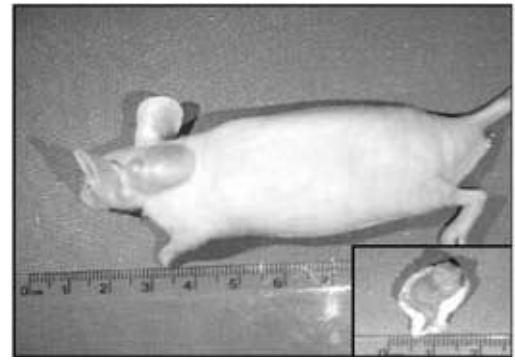
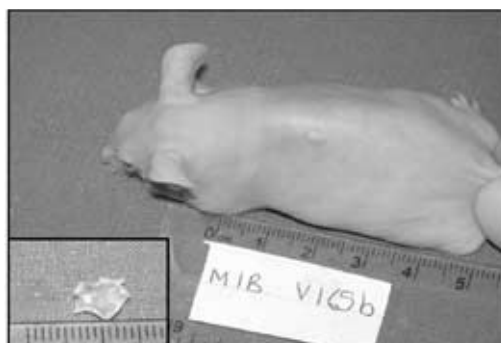


Fig 2. Human melanom xenographed into mice *in vivo*

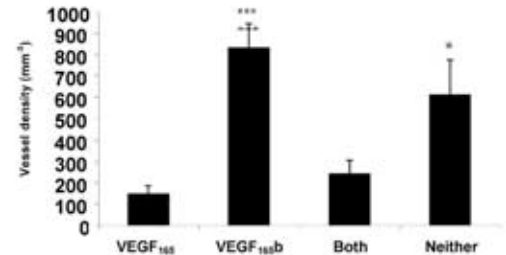


Fig 3. Vessel density of transfected tumours.

*= $p < 0.05$, ***= $p < 0.001$ compared to VEGF165, +++= $p < 0.001$ compared to both.

Anastomosis Size Mismatch – Numerical Modelling of Four Idealised Constructs

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Introduction

One criterion for selection of recipient vessels in microvascular surgery is size match. Abrupt changes in vessel diameter are thought to predispose to thrombus formation and early anastomotic failure, although experimental data is lacking. Where mismatch cannot be avoided, a number of surgical techniques are described.

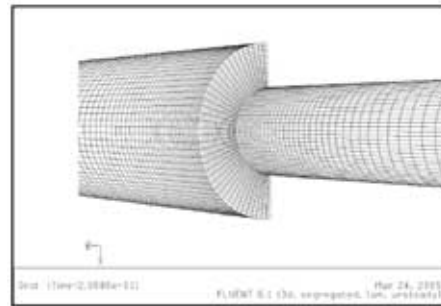
The aim of this study was to numerically model the haemodynamics of four different end-to-end techniques used to anastomose smaller arteries to larger.

Methods

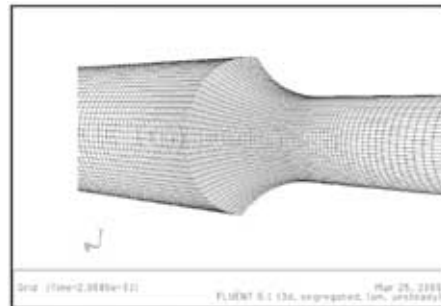
Four idealised models of 1mm diameter arteries anastomosed to 2mm arteries were constructed: (a) Sleeve, (b) Fish-mouth, (c) Wedge, and (d) Oblique cut (Figure 1).

Flow was considered laminar and Newtonian and vessel walls were considered non-compliant. Flow rate was recorded from the femoral artery of the rat. Constant whole blood viscosity and density were specified as 0.005 kg/ms and 1059 kg/m³ respectively.

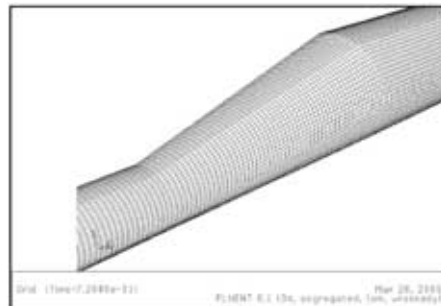
Flow path lines and wall shear stresses were calculated using the commercially available computational fluid dynamics (CFD) code FluentTM.



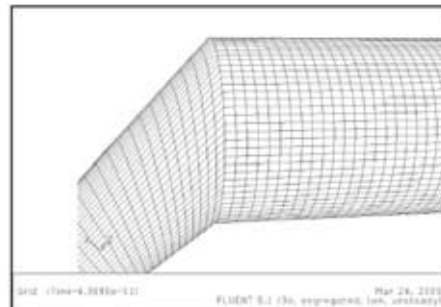
(a) Sleeve



(b) Fish-mouth



(c) Wedge



(d) Oblique Cut

Fig 1. Model Geometries.

Results

Regions of separated flow were observed for all configurations but the Wedge. The Sleeve and Fish-mouth configurations display similar regions of separated flow, whilst the Oblique-cut exhibits a more complex re-circulating flow structure. There were dramatic changes in vortex size and strength due to the unsteady nature of the flow.

Although the wall shear stress distribution is different for each configuration, the maximum wall shear stress value is very similar.

Conclusion

Whilst caution must be exercised when extrapolating results from these idealised CFD models into patterns of blood flow within compliant vessels, it can be concluded that the Wedge configuration demonstrates the least flow separation.

Versajet®. Hydrosurgery for Paediatric Burn Debridement

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Introduction

Early excision and split-skin grafting of deep partial-thickness and full-thickness burn injuries is believed by many to produce the best cosmetic result. The critics of this method feel that formal debridement removes viable dermis, and therefore, advocate a conservative approach in all partial-thickness injuries.

We have recently used the Versajet hydrosurgery system to mechanically debride partial-thickness burns in young children and present our initial experience.

Methods

We describe use of the Versajet hydrosurgery system in the treatment of our first 5 children with different depths of burn injury. One child with superficial scalds was cleaned and blisters debrided with the Versajet, then Biobrane® and Transcyte® applied 48 hours after injury. Three children with deep partial-thickness injury and one child with full-thickness injury were debrided prior to skin grafting. Warmed irrigation fluid is used and has resulted in much less heat loss during the grafting procedure.

Results

The Transcyte and Biobrane adhered well to the child with superficial partial-thickness injury and he healed quickly. The 3 children with deep partial-thickness injury healed quickly and have had excellent results at six-month review. The Versajet was less satisfactory in debriding the full-thickness injury and this was formally excised with a dermatome.

Discussion

We have found that an area of deep partial-thickness burn can be accurately debrided by this method with no damage to unburnt tissue, leaving a smooth graft bed with the deeper dermal elements intact.

Following these initial cases we now use the Versajet on a low setting to thoroughly clean more superficial scald injuries before application of Biobrane or Transcyte, allowing a little more time to get the children into theatre. We also use it on a slightly higher setting to debride necrotic dermis from deep partial-thickness injury prior to application of a thin split-skin graft. We found the system less effective in debriding the full thickness area resulting in significant grooving, and this has also been our experience with adult patients.

Our hydrosurgical approach allows dermal preservation yet still achieves early skin cover, which should result in better scar quality. This has been demonstrated by our early patients who have had very good scar outcomes six months after surgery.

Biobrane Experience in Bristol 2002-2003

AR Atun, TS Burge, AR Kay, C Estela
Frenchay Hospital, Bristol

Introduction

Biobrane is a biosynthetic dressing consisting of a nylon mesh coated with peptides derived from porcine type I collagen, and covered by a thin layer of silicone. It is commonly used in the treatment of superficial dermal burns, especially in children. Frenchay Hospital covers a population of 5 million for major burns. A large proportion of our superficial burn injuries are in young children (mainly scalds). At the start of 2003 we changed our management policy for superficial dermal burns in children to a theatre episode within the first 48 hours of injury, consisting of a physical cleansing and application of Biobrane when indicated.

Materials

A retrospective double-group cohort study was performed, looking at scar management interventions for paediatric scalds in 2002 and in 2003, after the introduction of Biobrane. The same team of Consultant Burns Surgeons, Physiotherapists and Occupational Therapist were in charge of the follow-up clinics for the period studied.

Results

Thirty-three scalded children were treated in 2002. All required active scar management – 29 requiring pressure garments and four the use of silicone. In 2003, after the introduction of Biobrane, 38 scalded children were treated. Of these, 12 required active scar management (6 pressure garments and 6 silicone dressings). Twenty-six required no intervention (Figure 1).

Statistical analysis using the Fisher exact test shows a highly significant difference between these two groups ($p < 0.0001$, Relative Risk 3.167 (1.983-5.057), Odds Ratio 142.0 (8.030-2513)).

Conclusion

Since our unit started the use of Biobrane in 2003, we have noticed a highly significant reduction in the need for active scar management following superficial dermal scalds in children.

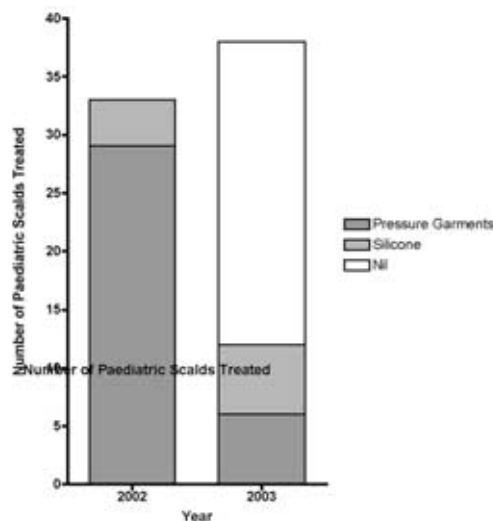


Fig 1. Scar management interventions for paediatric scalds before (2002) and after (2003) the introduction of Biobrane.

The Size of the Y: The Multiple Y-V Plasty Revisited

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Canniesburn Unit for Plastic Surgery

Introduction

The multiple Y-V plasty is often used in the release of linear burn scar contracture bands. Although there are established views regarding its design, no attempts have yet been made to describe its mathematical properties. An understanding of the mathematics, however, should theoretically result in a greater ability to “fine tune” or “tailor” the outcome. Our aim is therefore to delineate the mathematical principles of the multiple Y-V plasty as well as their clinical implications, and to dispel some of the myths and misconceptions surrounding the technique.

Methods

1. The mathematical principles underlying the technique are elucidated, using a simple trigonometric model; and
2. Our standard method of design and execution is presented.

Results and Conclusion

In a Euclidian plane, the equation describing the gain in length for a scar/contracture of length l and width a to which the technique of multiple Y-V plasty has been applied is:

$$lx/a$$

Where x is the only variable, and represents the distance by which the component triangular v-shaped flaps are advanced. It is clear from this equation that:

- i. Neither the angle of the Y, nor the number of triangles in the design play a role in the ultimate length gained; and
 - ii. The distance of advancement of the individual triangular flaps is the sole determinant of the length
2. In the design and execution of the technique, the following important principles are highlighted:
 - i. The component flaps should not under any circumstances be undermined - if this principle is adhered to, revision surgery can be performed in the same area at a later date and with disregard of the previous design;
 - ii. The advancement angles (the angles of the Ys) do not need to be equal – this follows from the mathematics, and its application lies in the avoidance of distortion to adjacent landmarks.

Posterior Cervical Masses in Rugby Football Union Front Row Forwards

JG Combes, DR Bayne, AN Pandya

Royal Hospital Haslar

Introduction

The presence of fibrofatty masses in the midline posterior cervical (nuchal) region of Rugby Union front row forwards is a common, but previously unreported phenomenon. This became apparent to the authors when 4 patients were seen within the course of a year, all requesting excision of such lesions for reasons of cosmesis. A common link was established between these individuals, that of playing front row forward in rugby union.

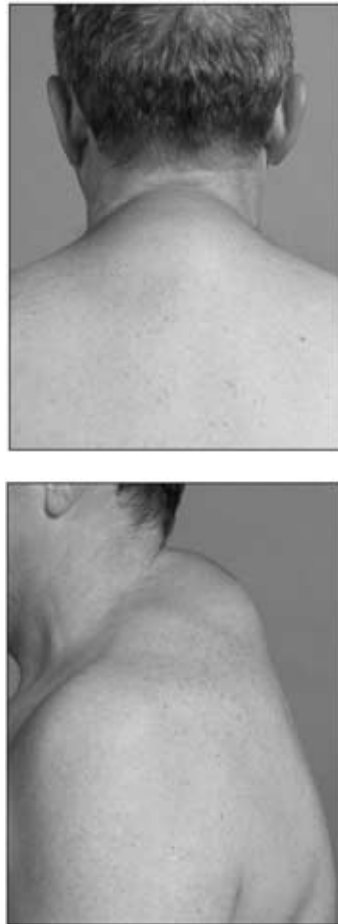


Fig 1. Posterior Cervical Mass in a Front Row Forward.

Case Reports

Four healthy males between the ages of 38 and 48 were seen by the authors within a period of 8 months, all complaining of similar-looking humps on the back of their neck (Figure 1). They unanimously attributed these lesions to the playing of rugby union in the position of prop forward.

All of the "humps" had been present for many years, increasing in size slowly but not steadily; more rapid increase occurring when participating in rugby union. The lumps would then tend to regress somewhat, but not completely resolve in the off-season.

All of the lumps were easily visible, firm to palpate and attached to skin over the C6-T1 region. They ranged from 6cm to 12cm in diameter, whilst

it was not possible to accurately assess protrusion in the sagittal plane. One patient had an inconclusive ultrasound scan followed up by MR imaging. The MRI scan reported an increased thickness of subcutaneous fat in the area of the mass but with the same MR signal as the surrounding fatty tissue. CT scan of another patient confirmed no involvement of the nuchal ligament with a density similar to that of the surrounding fat.

None of the lesions were deemed to be suitable for liposuction and hence they were removed surgically, under general anaesthetic. All were found to be vascular and unencapsulated which necessitated sharp dissection to facilitate excision. Excess overlying skin was also taken in two cases to ensure cosmetic correction. Vacuum drainage was used in all cases and removed on the first post-operative day.

All lesions were diagnosed histologically to be fibrolipomata, consisting mainly of mature adipose tissue and benign fibrocartilaginous connective tissue.

Discussion

We have been unable to find reports of lumps in the nuchal region associated with the playing of Rugby Football in the position of front row forward. There are however two distinct entities that occur almost exclusively in the midline of the posterior cervical region of similar nature to the lesions described here. These are Nuchal Fibroma or Collagenosis Nuchae, and Nuchal Fibrocartilaginous.

Pseudotumours, neither of which fit the aetiological, morphological or histological characteristics of the lesions described here.

Whilst we feel that the lesions we describe are related to soft tissue trauma, this is repeated, frictional trauma and not an isolated extension injury of the nuchal ligament as would be the case in whiplash. The action of scrummaging for a front row forward places considerable direct force on the postero-inferior area of the neck. This frictional trauma comes from the high pressure, moving contact of the acromial process of one front row forward with the back of the neck of his opposite number. There is relatively little protection for the spinous processes of the lower cervical vertebrae, especially as the overlying soft tissue is stretched thinly by the neck flexion that occurs when propping. We hypothesise that this force and the frictional movements that accompany it lead to trauma, which provokes a reactive response by the posterior neck subcutaneous tissue.

The Doughnut Mastopexy Approach for the Treatment of Grade II/III Gynaecomastia

DR Bayne, JG Combe, AN Pandyas

Royal Hospital Haslar

Introduction

Many surgeons are reporting a sharp year-on-year rise in referrals for gynaecomastia. The aetiology of this condition is often idiopathic. Liposuction is a well-recognised and effective treatment for this disorder but it is not suitable for all cases. The authors have used an open technique for gynaecomastia reduction in certain instances and present their technique and their results in 25 cases.

Patients and Methods

A retrospective review was performed of cases of bilateral gynaecomastia, treated between 2000 and 2005. Selection for open doughnut mastopexy approach was guided by:

- Previous, inadequate/insufficient liposuction.
- Webster type 1 or 2 gynaecomastia.
- Simon Group 3 gynaecomastia.
- Patient expectation unrealistic from liposuction alone.

Operative Technique. A wet infiltration technique was used (20mL Marcain® 0.5%, Hyalase® 1500 units, Adrenaline 1mg admixed in 250ml normal saline). Concentric circles were drawn around the areola, the inner circle based on the desired areola size, and spaced 1cm apart. This 'doughnut' ring was de-epithelialised. A semicircular subcutaneous skin flap was then raised inferior to the nipple meridian, with the flap thickness based on the patient's general fat covering. Dissection was continued in the retromammary space to the superior breast margin before a final superior subcutaneous dissection to release the breast disk. Drains were placed and skin was closed with circumareolar 3/0 Monocryl® and 4/0 clear Prolene®. Steristrip® and Mepore® dressings were covered with padding and tight compression garments.

Results

Twenty-five cases were available for review. Of these, 13 patients had previously undergone liposuction. One haematoma occurred. Two seromas were encountered, one in the patient with the haematoma. Neither seroma recurred after aspiration. One patient had an inverted scar on one nipple. All patients had a transient change of nipple sensation, but only three patients had reduced sensation beyond one month. Sensation had normalised by eight months. All patients except the one with an inverted scar were satisfied with their result.

Conclusion

The 'doughnut' technique provides reliable access and results in our criteria group, with a low complication rate and a predictable outcome.

The Novel use of a Vascularised Free Fibula as a Bracket to Stabilise Severe Cervico-Thoracic Kyphosis Associated with Neurofibromatosis Type 1

TWS Chapman, AL Crawford, AR Fitton, T Germon, J Unsworth-White
MDHU Derriford

Introduction

Taylor *et al.* first used the fibula free flap in 1975 to reconstruct a large tibial defect, and it has since become one of the workhorse flaps for mandible and long bone reconstruction. Non-vascularised bone grafts have been used as a technique for anterior spinal fusion, but in 1988 Doi *et al.* described the use of the free fibula in cervical spondylolysis. The authors are unaware of the use of

a vascularised fibula flap, transferred to create a bracketing strut to bridge severe cervico-thoracic kyphosis associated with Neurofibromatosis.

Case Report

A 43-year-old lady with type 1 Neurofibromatosis presented with a 2-year history of debilitating, intractable, interscapular pain, plus recent onset of progressively worsening neurological symptoms of bilateral lower limb paraesthesia, ataxia associated with frequent falls and, finally, immobility.

Examination revealed a high thoracic kyphosis and numerous widespread cutaneous manifestations of Neurofibromatosis type 1. CT demonstrated significant cervico-thoracic kyphosis of 45 degrees with the apex at T2, extensive vertebral body erosion supporting the impending inevitable collapse at T2, and a large soft tissue mass, identified on MRI as a left lateral meningocele but with no cord compression or features of malignancy.

Without surgical intervention the deformity and subsequent symptoms would have deteriorated with additional risk of impending pathological fracture and devastating neurological sequelae.

Treatment

The procedure was performed concurrently by cardiothoracic, neurosurgical and plastic surgeons as a multidisciplinary surgical team. An anterior cervical approach was made, extended as a mid-line sternotomy. A 10cm free fibula was harvested from the right leg. The fibula was fixed distally onto T5 and proximally to C5 + C6 at an oblique angle, creating a supportive bridge. Cancellous bone graft was packed around the fibula. A Halo vest was applied for 3 months.

Outcome

Clinical outcome was successful, with significant reduction in pain, and complete resolution of neurological symptoms. CT at 6 months confirmed solid fusion with no deterioration of kyphosis, and bone scan demonstrated vascularity of the fibula.

Discussion

This presentation will discuss the cervical abnormalities associated with type 1 neurofibromatosis, and will compare various surgical stabilisation techniques currently available.

The Military Management of Burn Injury - Some Historic Reflections

DEB Ayers, AR Kay

Frenchay Hospital, Bristol

The injurious effects of flame, smoke and chemical compounds have been known since ancient times and employed accordingly as weapons of war. Times of war have been a motor for rapid technological advancement in many fields, not least in medicine. Consequently burn injury has been a threat to fighting men throughout history. In the last century the advent of nuclear weapons added a further source of burn injury to the theatre of war and in more recent conflicts the use of modern thermobaric weapons has introduced new challenges for those treating the victims of armed struggle.

This is particularly the case in the discipline of plastic surgery and similarly burn management.

A comprehensive history of military burn management is far beyond the scope of this paper. Instead, some developments and trends in burn care are examined, alongside a few individual techniques as well as some of the personalities and places involved.

Burn Management in the Mediterranean Theatre of World War Two: A Lost Surgical Lesson?

JHW Clarkson
*Canniesburn Unit for Plastic
Surgery*

Introduction

The IVth Maxillofacial Unit managed 800 burnt servicemen in North Africa and Italy between 1942 and 1944; in addition to 3000 maxillofacial casualties.

Materials

Using evidence from prospectively collected data, Patrick Clarkson developed a program of early excision of burns and skin grafting. A discussion of these findings is supported by original data and case photographs held privately.

Results

Analysis of results from the IVth Maxillofacial Unit shows that the main predictor for duration of healing was not the size of the burn, but the method of resurfacing and the timetable to which this was geared. This marked a paradigm shift away from conservative burns management towards a modern era of aggressive surgical excision.

Their survival data produced an early burns mortality prediction curve, which went on to be modified by Bull in 1949 to incorporate the age of the patient. Early evidence for the beneficial use of topical antibiotic dressings is presented; topical penicillin was found to increase the rate of skin graft take.

Conclusion

This presentation offers a window back to very different times, yet much is strikingly recognisable in contemporary practice over 60 years further on. The question is raised: Were these early surgical lessons forgotten?