Take no chances

Haemaccel®

active ingredient; polygeline

ABRIDGED PRODUCT INFORMATION. INDICATIONS: 1. Prevention or treatment of shock associated with
reduction in effective circulating blood volume due to: (a) haemorrhage (visible, concealed); (b) loss of plasma
(burns, peritonitis, pancreatitis, crush injuries); (c) loss of water and electrolytes from persistent vomiting and diar-
rhoea. 2. As a plasma substitute in surgery where controlled haemodilution is employed. 3. Procedures involving extra-
corporeal circulation. 4. Carrier for insulin infusion. 5. Isolated organ perfusion. CONTRAINDICATIONS: Known hypersen-
sitivity to constituents of Haemaccel. Existing anaphylactoid reactions. WARNINGS: Infuse clear solutions only. Once
the bottle is opened, the solution should be used immediately. Any unused contents should be discarded,
since Haemaccel contains no preservative. There is a residual air volume in the container and
pressure infusions with the plastic infusion bottle must be carried out under supervi-
sion. Rapid infusion of Haemaccel, to normovolaemic patients, may stimulate re-
lease of histamine. Urticaria and rarely bronchospasm and hypotension may
occur (see Adverse Re-actions). Administration of red cell intra-
vascular/interstitial fluid volume may be hazardous. Blood losses up
to 25% of the blood volume can be replaced by Haemaccel alone.
Haemaccel may be given only after the prophylactic
use of H1 and H2 receptor antagonists to the follow
-ing patients. Patients with known allergic conditions
such as asthma, a history of histamine response or
patients who have re- ceived a histamine re-
leasing drug (such as anaesthetics, muscle
relaxants, analgesics, anticholinergic ganglion
blockers) within 7 days prior to Haemaccel
administration as they increase the risk of
histamine release. USE IN PREGNANCY AND
LACTATION: Haemaccel, for its usual indic-
ations, is not contra- indicated in pregnancy.
However, particular care should be exer-
cised when fluid or volume replacements
are administered dur- ing or immediately af-
ter pregnancy. Haem- accel is employed
during and following labour and no harmful
effects on the newborn have been reported. It
is not known whether poly-geline is excreted
in breast milk. ADVERSE EFFECTS: Transient skin
reactions (urticaria, whe- als), hypotension, tach-
ycardia, bradycardia, nau- sea/vomiting, dysponea,
rises in temperature and/ or chills may occasionally
occur. Rare cases of anaphy- lactoid reactions have been
reported with bronchospasm, tachycardia and severe hypo-
tension. Quincke's oedema has also been reported in such
instances. These reactions are due to histamine release and may be the
result of the cumulative effect of histamine-releasing drugs. They are
not true anaphylactic reactions on an immunological basis. If side effects
occur, the infusion should be discontinued immediately. If necessary, treatment should
be given as follows: Mild reactions: administer corticosteroids and antihistamines. Severe
reactions: if appropriate, immediately inject adrenaline (slowly I.V.), high doses of corticosteroid (slowly I.V.),
volume replacement (e.g. human albumin, Ringer's lactate solution), oxygen and, if necessary, resuscitation. DOSAGE AND
ADMINISTRATION: Haemaccel is administered intravenously, and can be infused immediately. Adults and children: 1. Prevention or
treatment of shock associated with reduction in effective circulating blood volume due to: (i) haemorrhage, blood loss up to 1500
mL - correct by use of Haemaccel alone, blood loss in the range 1500-4000 mL - recommended ratio, Haemaccel/whole blood is 1:1,
blood losses above 4000 mL - recommended ratio Haemaccel/whole blood is 1:2. The rate of infusion and total dose employed will
be governed by clinical assessment. In acute situations of severe rapid blood loss, large volumes and rapid infusion may be
required. The haematrocrit should not be permitted to fall below 25 to 30 volume % during therapy. (ii) relative
hypovolaemia.Normovolaemia and a high speed of Haemaccel infusion are considered as factors contributing to anaphylactoid
reactions in suceptible individuals. Where Haemaccel is used to restore circulating blood volume in the absence of loss of
intravascular fluid, the patient should be carefully observed for skin reactions, difficulty in breathing or precipitous fall in blood
pressure. (iii) burns. The management of extensive burns should be undertaken by specialised units. The volume of Haemaccel and
crystalloid given should be varied according to the clinical response of the patient and the assessment of renal function. (iv) water
and electrolytes. Haemaccel may be used to restore defic- iencies in circulating blood volume in conditions such as
persistent vomiting and diarrhoea. 2. As a plasma substitute in controlled haemodilution. Autologous
blood transfusion and haemodilution tech- niques involve the collection of 2-3 units of
blood from the patient after the induction of anaesthesia, each unit being simult-
aneously replaced by 500 mL of Haem- accel. During the operation, blood
losses are immediately replaced with an equal volume of Haemaccel,
as long as the haematocrit is above 0.25-0.30, or with blood
alone when the haematocrit falls below this level. 3. Procedures
involving extracorporeal circ- ulation. Use for priming heart-
lung machine, pump oxy- genator, plasmapheresis and
plasma exchange has been documented (see full Pre-
scribing Information).4. Carrier solution for insulin
infusion. Haemaccel, add- ed to the infusion fluid
before the addition of insulin, minimises ad-
sorption of insulin onto glassware and plastic
and allows a constant delivery rate to be
maintained. Concen- trations of polygeline
as low as 0.5X (100 mL: Haemaccel with
500 mL infusion sol- ution), are effective
for this purpose. 5. Iso-lated organ perf-
usion. Use in animal models has been doc-
umented (see full Product Information).
With impaired hep- atic function - no mod-
ification necessary. With impaired re-
nal function, Haemaccel has a beneficial effect
on renal function and no exacerbation of pre-
existing renal disease need be expected.
COMPATIBILITY: Provi- ded sterile precautions
are observed, Haemaccel may be mixed with ord-
inary infusion fluids (sal- ine, glucose, Ringer's so-
lution, etc.) and with drugs acting on the cardiovas-
cular system, corticosteroids, muscle relaxants, barbitur-
ates, vitamins, streptokinase and antibiotics of the penic-
illin series, provided they are water soluble. Citrated blood
(stored blood for transfusion) must not be mixed with Haemac-
cel (because the calcium ions in Haemaccel would cause reclass-
ification). However, it may be trans- fused immediately before or after an
infusion of Haemaccel. There is no objection to mixing heparinized blood with Haemaccel.
In common with all infusion fluids, Haemaccel - for physiological reasons - should not be ad-
ministered at a low temperature. PRESENTATION: Flex- ible plastic infusion bottle in 500 mL. REFERENCES:
1. Haemaccel Product Information. 2. Silvay, J et al Journal of Thoracic and Cardiovascular Surgery (1968), 55:350-358.
3. Merikallio, E, Annales Chirurgiae et Gynaecologiae (1976), 65: 138-144. 4. Donahue, J.G., et al NEJM (1992), 327:367. 5. Dax,
E., et al, MJA (1992), 157:69. Hoechst Marion Roussel Australia Pty. Ltd. ACN 008 558 807, Private Mail Bag 2067, Lane Cove
2066. Further information available on request. Haemaccel® is a registered trademark of Hoechst AG.

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TRAUMA Grapevine

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Introduction

It is interesting to reflect on Professor Trunkey's overview of trauma care and the evolution of trauma care in the United States and its implications both globally and for Australasia. What is clear is that definitive trauma care needs to be monitored. One aspect of trauma care that requires all systems to function properly is 'time to definitive care'. Previously in the Grapevine we discussed the concept of the "Platinum 30 Minutes". In this issue, on reviewing last month's Case of the Month, the patient's survival was due to expedient delivery of care involving rapid transport to the hospital by the Ambulance Service and provision of immediate Emergency Room surgery.

The case scenario in this issue, while different in terms of it's blunt trauma origin, adheres to the same principles. Timely application of EMST principles including arrest of haemorrhage are vital for optimum outcome. We need to reconsider the relative artificial concept of pre-hospital time and concentrate on total time to definitive care. This concept should not just apply to penetrating trauma but across the spectrum of trauma, with greater recognition of the need to be more aggressive in controlling haemorrhage rather than resuscitation, particularly in patients with unstable fractures and other complex injuries.

A sincere apology to the hundred or so people we had to turn away from SWAN VII Trauma Conference. SWAN VIII will be held on the 4th & 5th August, 2000, bringing to you at least four (4) world leaders in trauma care from the United States and England including Drs. Ledgerwood, Mattox, Asensio and Hodgetts.

Finally, of interest in this issue's "What's New" is the aggressive interventional treatment of hepatic Injuries. While this approach may not be appropriate for all hospitals in Australasia, it is certainly thought provoking.

Michael Sugrue

Do we need to legislate for trauma care?

Donald Trunkey, MD, FACS
Professor and Chair of Surgery, Oregon Health Sciences University

Introduction

The simple answer to this question is yes. Having given the answer some explanation is needed. I will try to explain this by asking three questions: Why have trauma centres? What are the steps towards a trauma system? And, finally, does a trauma system make a difference?

Why have trauma centres?

Another way to phrase the question listed above is - Does the current system or non-system of trauma care work? In the United States the evidence is overwhelming that a non-system of trauma care does not work. There are now 30 studies within the surgical literature[1] that document unacceptable rates of preventable death or disability if a trauma system is not in place. The first study was done in 1960 in the State of Texas where Van Wagoner showed that of 606 males, ages 19-54, 200 arrived in an emergency room alive and died without any surgical care[2]. Frye did a similar study in Michigan where he documented an 18% preventable death rate. Gertner showed a preventable death rate of 53% in Baltimore, Maryland[3]. We did several studies in the San Francisco Bay Area that showed preventable death rates ranging from 33%-73%[4,5,6]. In almost every geographic region of the United States where the problem has been studied preventable death rates range from 14%-85%. The average preventable death rate in these regions is 35%.

Continued next page

Do we need to legislate for trauma care?

Continued

How does one develop a trauma system?

There are seven steps in establishing a trauma system. These steps are:

Determine need

It is important to determine need within a region for the number of trauma centers to support the trauma system. The purpose of determining this need is to regionalise the trauma system, minimise the number of trauma centers which will then lead to increased experience and expertise care by surgeons and nurses. The second main reason to determine need is to minimise costs.

Establish authority

In the United States it has been necessary to legislate the trauma system. It is a unique aspect of health care in the United States and grants a franchise to the few trauma centers that end up being designated. It must be appreciated that this franchise in turn requires accountability by the trauma centers to the system and the state in which they have been designated.

Develop criteria (consultation)

Fortunately, the American College of Surgeons has published since 1976 criteria for optimal care of the trauma patient. These are updated every four years and should serve as guidelines for states or communities in the process of developing a trauma system.

Democratise the process

Since a franchise is given it is important that all hospitals be allowed to compete in the process. During the designation process, however, the total number designated must not exceed what has been determined in the needs assessment.

Obtain outside review and verification

This component of development is extremely important since it legitimises the designation process usually carried out by the state health division. It is a peer review process and again it is relatively unique since part of the review includes outcome measures based on chart review in that particular hospital.

Formalise designation

Since by the criteria above we now have legislation that legitimises the system, the health authority board must do the designation.

Ensure viability of the system, ongoing needs assessment and quality assurance -

The ongoing needs assessment is simply to make sure that there are enough trauma centres and that there are not too many. The quality assurance may be the most important component of all since this is what assures accountability back to the state health board.

Does a trauma system make a difference?

A logical question to ask before embarking on establishment of a trauma system is: What evidence is there that a trauma system makes a difference in outcome? Fortunately, the supportive data is fairly impressive. In 1974 one of the residents who graduated from the University of California, San Francisco surgical

"It is important to determine need within a region for the number of trauma centers to support the trauma system."

residency program went into practice in Orange County, California. Approximately six months later he contacted me and stated that trauma care in his region was unacceptable. He had approached fellow physicians in the Orange County Medical Society who did not agree there was a major problem. Dr. West and I agreed that a study needed to be carried out and we compared 100 trauma deaths in San Francisco County with 100 trauma deaths in Orange County[7]. We divided the deaths into those related to the central nervous system and those patients who bled to death. In those deaths related to the central nervous system in San Francisco there were no preventable deaths. The average Injury Severity Score was quite high compared to Orange County. Of those

A logical question to ask before embarking on establishment of a trauma system is: What evidence is there that a trauma system makes a difference in outcome?

patients who died from central nervous system causes in Orange County, only 12 patients out of the 60 deaths received a craniotomy. Eight patients had undiagnosed and untreated epidural or subdural haematomas at the time of autopsy. In those patients who bled to death in San Francisco County, there was only one patient who was potentially a preventable death. This particular patient had a ruptured thoracic aorta from blunt trauma. In Orange County, however, out of the 30 deaths due to haemorrhage 11 were considered clearly preventable. In four of these patients's the only injury was a ruptured spleen. An additional four patients had moderate lacerations to the liver and one patient had a simple laceration to the base of the mesentery. In all instances surgical care was either not provided or was delayed.

This data was presented to the Orange County Medical Society and they refused to accept the information. They were challenged to do their own study and they did[8]. The general surgeons by their own criteria found that 85% of the patients studied had potentially salvageable injuries. As a direct consequence of this study, in 1980, 5 of the 37 hospitals in Orange County were designated trauma centres and following this designation process a follow-up study was

Case of the Month

28 year old driver of a truck trapped at scene.

Pre-Hospital information

(M) Mechanism Driver into telegraph pole with confinement

(I) Injury Chest, Abdomen, Lower Limbs

(S) Signs RR 32/m, P 140/m, BP 70 mmHg, GCS 11

(T) Treatment Oxygen, C Collar, Spinal Protection, IV Fluids Extrication

Entrapment Time 32 minutes

IV Fluids 2.2 litres of colloid

Resus Room:

Primary Survey

(A) Airway Airway at risk GCS (6)
(B) Breathing RR 38/m Sats 92%

(C) Circulation Pulse 160/m
BP not palpable
Bleeding from compound right femur
No other external blood loss
(D) Disability GCS falling to 4.

As part of the primary survey, the patient was simultaneously intubated and bilateral large IV cannulas inserted. These were converted to rapid infusion devices with administration of ìOî Negative blood through a rapid infusion blood administrator on the left arm and warm fluids on the right arm. In the initial 15 minutes, x-rays of chest, c-spine and pelvis have been taken. A diagnostic peritoneal lavage was in the process of being done. A urinary catheter was passed. There is obvious bleeding (but not torrential) from the right compound femur fracture. The abdomen looked a little bit distended. The chest x-ray, which has returned, revealed no gross haemothorax on either side. Blood pressure improved to 75 systolic, Pulse 140/m after receiving resuscitation fluids: 3 units of blood, 2.7 litres of crystalloid and colloid coupled with 2.2 litres of colloid pre-hospital.

What would you do now?

What are the key factors that are going to effect the patient's outcome?

What are your time frames to definitive care?

Find out the patient's outcome - next month.

Review of last issue's case of the Month

A 24 year old male stabbed at a football match.

Pre-Hospital information

(M) Mechanism Stab

(I) Injury Anterior chest, 4th intercostal space, Lateral to sternal border

(S) Signs P 90/m, BP 100 mmHg, GCS 15

(T) Treatment Oxygen, IV Fluids, Morphine

Resus Room:

Primary Survey

On arrival, the patient was conscious, but while being transported into the resuscitation area deteriorated becoming unconscious with an at-risk airway. Air entry was faint. Pulse 110/m, BP not palpable. Patient was responding only to painful stimuli. Pre-hospital IV cannula in situ.

What is your plan of action?
This depends on the resources available to you. In an urban hospital, there should be simultaneous airway control with intubation and immediate chest decompression. Depending on the experience of the operator, this should be with an intercostal catheter directly into the second intercostal space anteriorly or the 5th intercostal space laterally. In the absence of a tension pneumothorax an immediate left antero-lateral thoracotomy should be undertaken. This requires three key items:

1. Personal protection (double gloving), eye goggles, face mask
2. A size 10 scaplel
3. Rib spreader

Once in the chest, inspection for tamponade is vital, release of the tamponade will return cardiac output. In this patient's case there was a tight pericardial tamponade with a right ventricular stab wound. A finger was placed in the right ventricular stab wound while the patient was resuscitated. He began to wake up, requiring sedation.

The next issue is how to fix the cardiac injury. Depending on resources again, suturing is optimal with 3/0 Prolene preferably on a pledget with a good light and a good assistant. In the event of a crisis, a skin stapler with approximation will minimise bleeding. Although, to be done properly, this also requires a good assistant. It is best therefore to wait until help arrives, with a finger over the cardiac laceration, making sure the patient does not wake up during the procedure. This patient had staples placed in the cardiac injury as our range of sutures was limited on the night in question. The patient made an excellent recovery without any sequelae.

What's New in Trauma

Interventional Techniques are Useful Adjuncts in Non-Operative Manage-ment of Hepatic Injuries.

Eddy Carrillo and colleagues, University of Louisville, Kentucky. J Trauma 1999; 46: 619-624.

Carillo and colleagues have undertaken a retrospective review of 135 patients with blunt liver trauma who were treated non-operatively between July 1995 and December 1997. They argue that non-operative management has become the standard of care for haemodynamically stable patients with complex liver trauma. This study was undertaken to evaluate the prevalence of complications and the treatment regimes used in patients with severe liver injuries. Of their 135 patients, 32 (24%) developed complications that required additional intervention of treatment. Procedures less invasive than laparotomy were often performed including arteriography and selective embolisation in 12 patients (37%). CT guided drainage of infected collections in 10 patients (31%), ERCP with sphincterotomy and stenting in 8 patients and laparoscopy in 2 patients. Overall non-operative interventional procedures were used successfully to treat complications in 27 patients (85%). They concluded that in haemodynamically stable patients with blunt liver trauma, non-operative management is the current treatment of choice. In patients with severe liver injuries, however, complications were found to be common. They advocate early intervention in the initial management of complications rather than surgery per se. The recognised current complications of hepatic injury include both fistulas, bile leaks with peritonitis, bilomas and haemobilia.

Comment

In the past we have tended to treat some of these complications surgically. This article is of interest and thought provoking for those of us who have the resources at our disposal to treat such complications.

Prospective Evaluation of the Potential Role of Teleradiology in Acute Interhospital Trauma Referrals.

Andrew Kilpatrick and colleagues, Vancouver Hospital. J Trauma 1999; 46: 1017-1023

Kilpatrick and colleagues have undertaken a study to evaluate the potential impact of pre-hospital teleradiology systems on trauma patient management and transfer. 44 injured adults, transferred to a trauma centre were included. The history, physical examination and radiographic findings reported by the referring doctor to the receiving hospital were documented. Plain x-rays of chest, pelvis and C-spine taken at the hospital were obtained after patient transfer. For each case two blinded reviewers and one unblinded reviewer were individually presented with the referring doctor's report and the x-rays. The reviewers were surveyed as to the implications of viewing the plain films taken at the referring hospital before the patient transfer.

They found that the blinded reviewers felt that reviewing x-rays before transfer would have influenced care in 40% and 38% as judged by a surgeon and emergency physician respectively, with a crude agreement of 67.5%. The blinded reviewers commonly noted the following four changes in management as a result of viewing the x-rays:

1. Requesting further clinical history
2. Suggesting pre-hospital transfer interventions
3. Performing pre-hospital diagnostic tests
4. Emphasising precautions during transfer

The non-blinded reviewer suggested potential influence in the management of at least 65% of cases. Kilpatrick and colleagues in this study suggests that viewing x-rays of acutely injured trauma patients has the potential to influence many aspects in the management of intra-hospital transfer.

Comment

It is appropriate that given the remoteness of certain hospitals in Australia, that all regionalised trauma sectors utilise teleradiology and audit and monitor their use.

Dry Fibrin Sealant Dressings Reduce Blood Loss Resuscitation Volume, and Improve Survival in Hypothermic Coagulopathic Swine with Grade V Liver Injuries.

John Holcomb and colleagues, US Army Institute of Surgical Research , Houston Texas. J Trauma 1999; 47:223-242

Drs Holcomb and colleagues raised the issue of how the majority of early trauma deaths are caused by uncontrolled haemorrhage, frequently complicated by hypothermia and coagulopathy. They argue that any haemorrhage control technique that achieves rapid haemostasis, despite a coagulopathy should improve outcome. Their study determined whether dry fibrin sealant dressing (DFSD) would stop bleeding from grade V liver injuries in pigs, that were hypothermic and coagulopathic.

Pigs were rendered hypothermic by 60% isovolemic exchange transfusion and grade V liver injuries induced. DFSD dressings were compared with conventional liver packing with gauze sponges or IgG placebo sealant dressings. They measured blood loss, arterial pressure, resuscitation volume and core temperatures. At the time of injury, the temperature was 33.3°, hemoglobin concentration at 4.4g/dL and platelet count 132,000.

The post treatment blood loss in the DFSD group was 669 ml which was significantly lower than 3,320 ml and 4,400 ml in those exposed to conventional packing and the IgG group respectively. The one hour survival in the DFSD group was 83% compared to 0% in the other two groups. They concluded that in pigs with grade V liver injury, complicated by dilutional and hypothermic coagulopathy, DFSD is a simple, effective method of controlling haemorrhage.

Comment

This study provides an important potential advance in haemorrhage control. It may have important implications in the treatment of major liver and retroperitoneal injuries in Australian trauma victims.

done which showed the preventable death rate had fallen to 4%. However, if the patients were mis-triaged and taken to a non-trauma centre, the preventable death rate remained at 53%.

A more comprehensive study was done prior to the establishment of a trauma system in San Diego County, California[9]. A prospective examination of patient care prior to the trauma system being established showed there were delays in evaluation in 41% of the patients. Inadequate care was documented in 32% of instances and the preventable death rate was 20.9%. Following establishment of a trauma system, the delays in evaluation fell to 11%, inadequate care fell to 2.6%, and preventable deaths fell to 9%. The preventable death rate has now fallen over the last few years to less than 1%. This serves as yet another example of the stark contrast of care provided before and after establishment of a trauma system.

One of the best examples of the value of a trauma system comes from West Germany[10]. In 1970 the West German government established 27 trauma centres strategically located along the Autobahn. Ground rescue and helicopter ambulances serve these centres. Trauma surgeons, anaesthesiologists and speciality surgeons are in-house 24-hours a day to provide instant definitive surgery to the trauma patient as soon as necessary. Since 1970 the annual mortality from motor vehicle accidents in West Germany, once the patient has reached the hospital, has decreased from 16,000 to 8,100. Most importantly, the West German system also includes an excellent rehabilitation network and approximately 85% of the critically injured patients return to work within a one-year period of time.

"This data was presented to the Orange County Medical Society and they refused to accept the information."

Components of a trauma system

As noted above, the American College of Surgeons Committee on Trauma have published the criteria required for a trauma system. There are four patient components to a trauma system: access to care, pre-hospital care, hospital care, and rehabilitation.
Access to care implies a national network of a common phone number so that people can get emergency help when an accident occurs. Examples include 911 in the United States and 999 in Europe. It also implies there is central dispatch where police, fire or ambulances can be dispatched immediately to the scene of an accident.

"One of the best examples of the value of a trauma system comes from West Germany[10]."

Pre-hospital care is comprised of two primary components, ambulance personnel and equipment. Of the two components the personnel who do the resuscitation and triage are the most important. These individuals must be highly skilled in providing advanced life support techniques and yet at the same time recognise that it will be impossible to stabilise an unstable patient in the pre-hospital setting. It thus must be decided by the medical community, which advanced life support techniques really make a difference in the pre-hospital setting and provide quality assurance for the individuals who provide this care. The intent is to rapidly transport the unstable patient to a trauma centre and at the same time prevent unnecessary death and disability.
Sixty-two percent of trauma deaths occur within the first four hours of admission to the hospital. It thus becomes imperative that surgeons, anaesthesiologists, and nurses necessary to treat life-threatening injuries must be present at the time the patient arrives in order to initiate resuscitation and definitive surgical care as soon as possible. No study demonstrates this more vividly than the one by Becker and his colleagues from the Medical College of Virginia.[11] They showed those patients with mass lesions who were operated on within two hours of injury had a 73% survival rate. Patients who were operated on within 2-4 hours of injury had a 62% survival rate, 8% had bad neurologic outcomes and 30% died. If for any reason the patient's surgery was delayed longer than four hours after the injury, survival was reduced to 10%, 12% had bad neurological outcomes and all the rest died.

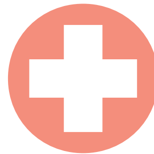
Another study that emphasises the importance of hospital care comes from Yale University[12]. Late deaths due to traumatic injury prior to the establishment of a trauma centre was approximately 25%. After establishment of the trauma centre it fell to 6.1%. This study illustrates the importance of having a skilled surgeon taking care of the patients in the intensive care setting following their injury.

Rehabilitation is the final patient component. In the United States it has been shown in communities where there is no trauma system that only 10% of patients get access to rehabilitation care.[13] Tragically this results in patients who become permanently disabled and require custodial care. A study done in 1985 determined rehabilitation and independent living service can provide deinstitutionalisation for more than 3/4 of the patients currently institutionalised at a cost of 1/10 of their custodial care[13]. As mentioned previously, when rehabilitation facilities are adequate approximately 85% of patients will return to full productivity within a short time of their injury.

Continued next page

Summary

There are two recent review articles that give an in-depth analysis of trauma systems in the United States[14,15]. The first of these was published in 1988 and used eight criteria to judge the success of trauma systems in the United States. More recently, a paper by Bazzoli, et al. showed that trauma systems have expanded and are complete in five states.[15] An additional 15 states have incomplete systems but most of the components of a trauma system. Most interestingly, Bazzoli et al. showed that the most common reason for states failing to meet all of the trauma system standards is their neglecting to place limits on the number of designated trauma centres. This is particularly disappointing since it is one of the cornerstones of the American College of Surgeons optimal criteria. Furthermore, at least two studies[16,17] have shown that mortality can be reduced when trauma patients are concentrated in a few centres and professional experience (ie, of physicians and nurses) is increased. A potential added benefit is the reduction in cost achieved by reducing the number of centres, although hard data do not yet support this premise.



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Meetings

Port Macquarie Regional Trauma Evening
30th September, 1999.
Contact: Suloch Middleton, Port Macquarie Base Hospital.
Phone: 6580 1001

Trauma Section to General Surgeons - Inaugural Scientific Meeting
6th - 9th October, 1999
Sheraton Mirage, Gold Coast, Queensland Australia
Contact: Intermedia Convention and Event Management Pty Ltd
Phone: 07 3369 0477

Trauma into the Millennium.
Alfred Hospital, Melbourne
5th & 6th November, 1999
Contact: Lorinda Young
Phone: 03 9276 2000

Australasian Trauma Society Meeting
20th November 1999 Auckland, New Z
Phone: 64 7 8383123

Laparoscopy in Trauma

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This paper will provide an overview of the current role of laparoscopy in trauma, tailored for Australasian patterns of abdominal injury.

The South Western Sydney Regional Trauma Registry identified that between 1995 and 1998, we have seen 602 patients with documented abdominal injuries admitted to Liverpool Hospital. Blunt trauma accounted for 494 (82%) of the group. An array of investigations were performed including DPL in 81 patients, CT in 87, FAST in 24 and Laparoscopy in 26.

In the management of blunt and penetrating abdominal trauma one should aim to have a therapeutic laparotomy rate approaching 90%. Figures from Liverpool Hospital are shown in Table 1 and as you can see our overall therapeutic laparotomy rate is 81%.

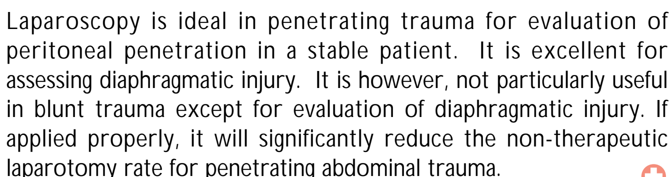
Table 1

Laparotomies for Trauma	95	96	97	98	99 (to date)
Therapeutic	47	57	56	42	40
Non-Therapeutic	12(6)	10(5)	9(2)	7(4)	6(1)
TOTAL	59	67	63	49	46

Forty-one per cent of our non-therapeutic laparotomies have been for penetrating injury. Laparoscopy is increasingly used within the hospital, especially in penetrating trauma and has been used in 26 patients in the last four years. This has resulted in a reduction in our non-therapeutic laparotomy rate for penetrating trauma. Our indications for laparoscopy are for: evaluation of peritoneal penetration in anterior stab wounds and evaluation of potential diaphragmatic injury where there are stab wounds to the thoracic part of the abdomen. There are occasions when we may use laparoscopy in blunt trauma for diagnosis of diaphragmatic rupture, evacuation of haemoperitoneum and occasionally drainage of biliary collection. Our main indication however, is to diagnose the presence or absence of peritoneal penetration. Anterior stab wounds do not penetrate the peritoneal cavity in 30-40% of these patients and therefore there is no need for laparotomy. If one adopts the approach of mandatory laparotomy in all patients with anterior abdominal stab wounds, unnecessary surgery will occur. Patients are discharged on the day or the day after their diagnostic laparoscopy. If there is peritoneal penetration one should proceed to laparotomy, as failure to do so will result in a missed injury rate approaching 30%. While some of these may be insignificant, missed pancreatic or colonic injuries may be fatal. The technique I would recommend for laparoscopic approach is using an angled telescope, 30°, inserted through an open approach in the umbilical cord. Alternatively, 2mm scopes can be used although realistically they donít offer much advantage over the 10mm scope.

There are some pitfalls in undertaking laparoscopy for penetrating trauma. There is a significant time required. It is important to remember that trauma patients are different than general surgery patients. In the presence of a thoracic abdominal stab wound, a tension pneumothorax can result. It is important therefore to insert a chest tube prior to performing laparoscopy. In patients with severe head injuries, laparoscopy will increase intracranial pressure and may also contribute to an abdominal compartment syndrome and visceral hypoperfusion in underperfused patients. There are a number of other areas where laparoscopy has been used in trauma patients, including the evaluation of tangential gunshot wounds. This may be appropriate in individual cases, but we would recommend mandatory laparotomy in all anterior gunshot wounds. Evaluation of flank wounds and posterior lumbar stab wounds is difficult with laparoscopy and it would not be a favoured approach. While it is technically possible to mobilise the colon and get an adequate view, this may be time consuming and inappropriate in the trauma patient. Laparoscopy should never be used in an unstable patient.

Conclusions and Recommendations



Laparoscopy is ideal in penetrating trauma for evaluation of peritoneal penetration in a stable patient. It is excellent for assessing diaphragmatic injury. It is however, not particularly useful in blunt trauma except for evaluation of diaphragmatic injury. If applied properly, it will significantly reduce the non-therapeutic laparotomy rate for penetrating abdominal trauma.

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