

Paediatric trauma

Childhood trauma is a major cause of mortality and morbidity, disability and socio-economic burden.

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The global burden of childhood injuries

The World Report on Child Injury Prevention was published by the WHO and UNICEF in 2008. The report regards child injuries and deaths as a major public health problem requiring urgent attention.¹ Childhood injury and violence are the predominant killers of children throughout the world; it is estimated that they are responsible for the death of approximately 1 million children under the age of 18 years annually. Accidental injuries account for the vast majority (90%) of these cases, while the

remainder (10%) is estimated to be due to violence or maltreatment.

So, every day more than 2 000 children and teenagers die from an injury which could have been prevented. Road traffic injuries alone are the leading cause of death among 15 - 19-year-olds and the second leading cause among 10 - 14-year-olds. In addition, tens of millions of children require hospital care for their injuries and many of them are left with a degree of disability.² It is estimated that over 95% of all deaths due to injury in children occur in low- and middle-income regions and countries. Although the child injury death rate is much lower among children from developed countries, injuries are still a major cause of death, accounting for about 40% of all child deaths.

Imaging: What's new?

Radiological imaging represents a significant part of the diagnostic process in paediatric trauma. Physical examination can be difficult, in particular in small children, but also because a high proportion of the injured children are poly-traumatised, often with associated head injury. Childhood tissues are more vulnerable than those of adults to the effects of radiation, predisposing to malignancies in later life.^{3,4} Therefore radiation doses should be kept as low as possible, while maximising the detection of injuries. Increasing awareness of the risk of radiation-induced malignancy has led to the search for alternative diagnostic strategies.⁵

Lodox®

The development of the total body digital imaging device with slot scanning technology (Lodox®) has been able to lower the radiation dose with a minimal amount of scattered radiation, enabling parents or caretakers to remain in close proximity of the child that is being imaged. This new type of total-body scanning with low radiation has revolutionised diagnostics of injured children.^{6,7}

Emergency ultrasound or focused abdominal sonography for trauma (FAST)

The use of ultrasonographic modalities in the assessment of trauma in children is gaining popularity. Data from a 2008 survey of children's hospital emergency departments in the USA showed that only 60% were using emergency ultrasound for managing paediatric patients.⁸ The last several years, however, there has been a marked increase in the literature regarding the use of emergency ultrasound in paediatric patients.⁹⁻²⁰ And as of 2011, nearly all paediatric emergency departments in the USA use emergency ultrasound.⁸ Ultrasound in trauma patients can be used, for example, for identifying clavicle or femur fractures or guiding fracture reduction.^{11,12,18} Bedside emergency ultrasound further accurately diagnoses paediatric skull fractures with positive and negative predictive values of 97.2% and 100% respectively when compared with a CT scan.²¹ For blunt abdominal trauma a CT scan of the abdomen with intravenous and enteral contrast has been the standard of care for the evaluation of the peritoneal

cavity and the retroperitoneum. The FAST scan is a 4-view scan reliant on detecting the presence of fluid within the most dependent zones of the peritoneum in the horizontal patient and pericardium. It is capable of detecting more than 100 - 250 ml of free fluid.²² Abdominal ultrasound has a modest sensitivity for the detection of haemoperitoneum in children with blunt abdominal trauma; therefore a negative ultrasound examination has questionable utility as the sole diagnostic test to rule out intra-abdominal injury. However, a positive ultrasound examination in a haemodynamically stable child should lead immediately to abdominal computed tomographic scanning because of the high risk of intra-abdominal injury.²³

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Laparoscopy

Use of minimally invasive surgery in paediatrics developed more gradually than in general surgery.²⁴ However, today its role is well established and indications are increasing daily. Laparoscopy in paediatric trauma is a safe method for the evaluation and treatment of selective blunt and penetrating abdominal injuries in haemodynamically stable patients.²⁵ Laparoscopy serves as a diagnostic tool in abdominal trauma, which reduces the morbidity of a negative laparotomy.²⁶ Laparotomy, however, remains the gold standard for diagnosis and treatment of injuries in a child with haemodynamic instability. The operation is not without risks, including a 20% morbidity rate, 0 - 5% mortality, and a 3% long-term risk for bowel obstruction.^{27,28}

Management – what's new?

Non-operative management of abdominal injuries

Management of paediatric abdominal trauma has evolved over the last four decades. Current strategies of non-operative management for most (90%) blunt solid organ injuries developed out of the observation that most solid organ injuries would 'heal themselves' and that operative intervention could indeed interfere with this process.²⁹ Organs most commonly injured are the liver and spleen, followed by kidney, pancreas and hollow viscera. Prescription during the admission process includes intravenous maintenance fluids, appropriate analgesia and a nil *per os* regimen, as well as bedrest for a 'clinically appropriate' duration. The setting of the care, i.e. whether in a high care/intensive care or ward environment, will be dictated by the clinical and metabolic condition of the patient, as well as by associated injuries, particularly intracranial pathology. In 2000 the American Paediatric Surgical Association published guidelines for length of hospital admission and restriction of activity based on the radiological grade of injury.³⁰ The current trend is for significantly shorter periods of both bedrest and hospitalisation.

Another trend in surgery is early enteral feeding. Enteral nutrition is associated with preservation of gastrointestinal (GI) mucosal integrity, attenuation of the stress response to shock and injury and maintenance of normal GI tract flora.³¹ The majority of treatment failures occur within the first 12 hours. Most of these can be managed outside the acute period and, in addition, many interventions will be performed percutaneously and endoscopically, avoiding open exploration.²⁴ Despite their delayed intervention, the long-term outcome of this group of patients is not compromised, with the added benefit that they are spared the insults of early surgery. Follow-up imaging is on an individual basis.

Laparoscopy for management of organ injuries

Minimally invasive surgery (laparoscopy) has not only been utilised for diagnosis

but has also been performed for the management of complications following conservative management of solid organ injuries. Splenic cysts which do not resolve over time can be treated with partial splenic decapsulation. Bile leaks following liver injuries can occur in up to 6% of patients and can usually be treated with endoscopic retrograde cholangiopancreatography (ERCP) and stent placement, accompanied by external drainage of bile collections. Laparoscopic guided external drainage of loculations can be useful for correct positioning of intra-abdominal drains. Where minimally invasive surgery has been slow to gain popularity in paediatric surgical practice, improved equipment and instrumentation suitable for children means that more complex cases can be treated successfully today. General benefits of minimally invasive surgery include less postoperative pain and shorter hospital stay.²⁴

Management of brain injuries

Recognition of the heterogeneity of head injury and the growing appreciation of the role of secondary injury (brain swelling, insults, hypoxia) are important

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in determining outcome. A modern approach is to identify patients who are not responding adequately to medical measures for reducing intracranial pressure early and to perform an adequate controlled decompressive craniectomy while avoiding hypertension in the postoperative phase. When these guidelines are adhered to, decompressive craniectomy can markedly reduce the intracranial pressure and improve brain oxygenation.³²

The future and the importance of preventing childhood injuries

The public health approach requires that we view child injuries similarly to any other disease or health problem,³³ and that injuries are predictable rather than random events. By utilising a combination of strategy (the four Es of injury control: Education, Enforcement, Engineering and Environment) modification, the incidence of violent injuries can be reduced. It is very likely that a large percentage of the so-called accidental injuries of children are actually outcomes of certain types of abuse. Over the last

few years we have witnessed a medical strive to improve trauma care in nearly all countries. However, the time has now arrived that paediatric care providers, and in particular paediatricians and paediatric surgeons, should unite to establish a proper foundation on which future preventive strategies can be built.

By actively promoting child safety we will not only achieve a most welcome reduction in medical costs and disability, but a much-desired decrease in avoidable childhood misery and suffering.

References available at www.cmej.org.za

IN A NUTSHELL

- Childhood trauma will be the number 1 disease globally in 2020 as expected by the World Health Organization (WHO), who published their third World Report on Child Injury Prevention in December 2008.
- Trauma in children has become a major cause of mortality and morbidity, disability and a socio-economic burden.
- The magnitude of paediatric trauma worldwide was reviewed with additional developments and trends in paediatric trauma.
- Paediatric trauma is a growing field of clinical expertise.
- New developments in imaging and management are discussed: total body digital imaging, emergency ultrasound, diagnostic laparoscopy, targeted management of head injuries, conservative management of abdominal injuries in children, and the laparoscopic management of complications following the conservative management of solid organ injuries.
- Child injuries should be looked at similarly to any other disease or health problem. Paediatric trauma has long been neglected by the medical profession.
- Nowadays, however, awareness is growing, as evidenced by a marked increase in the literature on diagnostics and management in paediatric trauma. Focus should be on primary (preventing the injury), secondary (dealing with the injury in the most efficient manner) as well as tertiary prevention (making sure that children treated for trauma will be appropriately reintegrated within our society).
- By actively promoting child safety we will not only achieve a most welcome reduction in medical cost and disability, but also the ever-so-much desired decrease in avoidable childhood misery and suffering.

SINGLE SUTURE

Oxytocin helps people with alcoholism beat cravings

A whiff of 'love hormone' may help people beat alcoholism.

Cort Pedersen at the University of North Carolina at Chapel Hill and his team gave 11 alcohol-dependent volunteers two daily doses of an oxytocin nasal spray or a placebo during the first 3 days of a detox programme. The volunteers also received lorazepam – a detox drug – when their withdrawal symptoms reached a specific level.

The oxytocin group had fewer alcohol cravings and milder withdrawal symptoms than the placebo group, and used just one-fifth of the lorazepam (*Alcoholism: Clinical and Experimental Research*, <http://dx.doi.org/jgp>). 'Four [oxytocin] volunteers didn't need any lorazepam at all,' says Pedersen.

This is good news because lorazepam is highly addictive. While it reduces anxiety and seizures during alcohol withdrawal, users can experience insomnia and cravings when they come off the drug.

Although it is unclear how oxytocin – famed for its role in social bonding – helps to aid withdrawal, it has no known side-effects. Pedersen hopes that alcoholics who take the hormone will therefore be less likely to experience the unpleasant symptoms that can lead to relapse.

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