



# Article review: Pelvic fracture: The last 50 years

By Margaret Dymond,  
RN, BSN, ENC(C)

## Case

A 54-year-old male is bucked off a horse at full gallop and lands on his left side. EMS report no LOC, GCS 15, B/P 90/60, pulse 132, respiratory rate 28, SpO2 98% with a non re-breather mask, decreased breath sounds on the left side, pain and instability of the pelvis on palpation, tender abdomen, blood at the urinary meatus and laceration to forehead. Two large bore intravenous catheters have been inserted infusing normal saline. Spinal motion restriction devices are applied prior to arrival in the emergency department.

As care continues the patient does not respond to resuscitation measures and remains hypotensive. What does the evidence suggest as optimum management for unstable pelvic fractures with ongoing bleeding?

## Introduction

Care and treatment of pelvic fractures has evolved over the last five decades.

Flint and Cryer (2010) describe the evolution that has occurred and that the successful management of pelvic fractures remains a difficult clinical problem. The short-term goal is to control bleeding and prevent death from exsanguinating hemorrhage. The long-term goal is to definitively treat the pelvic fracture and associated injuries

**Table 1. Common mechanisms of injury associated with pelvic fractures**

- Blunt force impacts by MVC
- Heavy force transfer
  - Car-pedestrian
  - Motorcycle crash
- Falls > 15 feet

with less morbidity for the patient—achieving pain-free walking, urinary continence, and normal sexual function.

## Incidence of pelvic fractures and associated injuries

Demetriades et al. (2002) studied the epidemiology of pelvic fractures: 9.3% of patients with blunt trauma had pelvic fractures. Of these, 16.5% had intra-abdominal injuries with the liver, bladder, and urethra the most commonly injured organs. When a severe pelvic injury is present, 30.7% of patients had associated intra-abdominal injury. Death as a result of pelvic fractures is rare (<1%), but if the pelvic fracture is present along with multiple severe injury patterns, mortality can reach up to 15% (Demetriades et al., 2002).

Table One describes common mechanisms of injury that predispose the patient to severe pelvic trauma (Demetriades et al., 2002).

## Classification of pelvic fractures and risk of bleeding

A common classification system used to grade pelvic fractures is the major force vector. This includes lateral compression, anterior compression, vertical shear and combined forces, plus degree of bony displacement (Flint & Cryer, 2010). This system does not accurately predict the risk of bleeding to assist in identification of patients who are at risk. Patients with severe bony injuries to the pelvis may not have massive bleeding. Other patients with significant pelvic bleeding may have minimal pelvic trauma (Flint

**Table 2. Common injuries and assessment findings**

Injuries	Assessment Findings
Pelvis	Pain on palpation of the pelvis Instability on palpation Shortening or abnormal rotation of the affected leg Hypovolemic shock
Intra-abdominal injuries	Abdominal contusions/abrasions Abdominal rigidity Involuntary guarding Rebound tenderness Hypovolemic shock
Bladder/urethral injuries	Suprapubic pain/tenderness Urge to void but unable Blood at urinary meatus Perineal ecchymosis Blood in the scrotum Hematuria Displacement of the prostate gland
Rectal/vaginal injuries	Bleeding from rectum or vagina
Open pelvic fractures	Obvious open wounds Palpation of bone protrusion on rectal/vaginal exam

& Cryer, 2010). Since the grading system is inadequate to predict risk of bleeding, assessment and risk of bleeding from pelvic fractures is determined by physical assessment, mechanism of injury, imaging, and the hemodynamic status of the patient (Flint & Cryer, 2010).

## Common injuries and assessment findings associated with pelvic trauma

Injury to the liver, urethral trauma, perineal trauma and bladder rupture are the most common injuries associated with pelvic trauma. Some patients may have no physical findings, yet have a urethral injury (Flint & Cryer, 2010). See Table Two.

## Treatment of pelvic fractures

Prior to 1970, bleeding associated with pelvic fractures was managed in the operating room. Due to difficulty identifying the source of bleeding, many patients died during surgery from exsanguinating hemorrhage (Flint & Cryer, 2010). Newer surgical and nonsurgical approaches have been implemented to reduce death from exsanguination and morbidity from pelvic trauma.

The first treatment priority for trauma patients is assessment of the primary survey. Ensure the airway is patent and secure. Maintain adequate ventilation and

oxygenation. Check the patient's vital signs and for external exsanguinating hemorrhage. All trauma patients should have two large bore intravenous catheters inserted infusing warmed isotonic solutions at rates consistent with the patient's clinical status. Consider infusion of blood and/or blood products if hypovolemic shock is present.

Once the primary survey is completed, the secondary survey is performed taking care to assess for other associated injuries with pelvic trauma. When a urethral injury is suspected, a transurethral catheter insertion is avoided, as a partial urethral tear can become a complete transection of the urethra. Imaging may be required to determine the severity of the urethral injury and if insertion of a urethral catheter is appropriate. Insertion of a suprapubic catheter may be required for some patients.

When the immediate needs of the patient have been addressed, the pelvic fracture will require management. See Table Three.

Early management of the pelvic fracture is key to preventing exsanguination, long-term dysfunction with ambulation, voiding problems, and preserving sexual function. Multiple treatment modalities may be required including pelvic binding in the emergency department to stabilize the fracture, along with active resuscitation. Pelvic binding with a sheet tied around the pelvis, pelvic C-clamp, external fixator, or compression device

can reduce pelvic volume and increase pelvic retroperitoneal tissue pressure potentially decreasing bleeding. Pelvic binding has been effective for patients with venous bleeding, but not in the occasional patient with arterial bleeding (Flint & Cryer, 2010).

Angiography with embolization of the bleeding vessels is a possible option if bleeding persists in a patient with a poor response to pelvic volume reduction techniques and active resuscitation (Flint & Cryer, 2010). Complications of embolization include gluteal muscle or rectal necrosis (Flint & Cryer, 2010). In some trauma centres, mobile angiography is available to come to the emergency department and prevent unnecessary movement of the hemodynamically unstable patient to the interventional radiology suite (Morozumi et al., 2010).

Another option for stabilizing a patient bleeding from a pelvic fracture is gauze packing of the pelvic retroperitoneum if angiography is not readily available. One study demonstrated a reduced mortality rate when embolization with operative management such as gauze packing was performed (Flint & Cryer, 2010).

Definitive management for severe pelvic fractures usually requires open reduction and internal fixation (ORIF). Research has demonstrated that patients who have early ORIF have less disability with ambulation than patients who are managed conservatively, and early definitive repair of the injured urethra is

**Table 3. Management of unstable pelvic fractures**

Year	Management Strategy	Result
<1970	Exploration of pelvic hematoma	• Exsanguinating hemorrhage
>1980	Pelvic Volume Reduction Pelvic Binding Sheet Commercial device External Fixator	• Easy to accommodate in emergency departments • Not effective if bleeding is arterial
>1990	Angiographic embolization	• Identify source(s) of bleeding • Helps stabilize the patient prior to the operating room • May not be available in all centres • Unstable patients may have to leave the ED for the procedure
>1990	Pelvic gauze packing	• Works well when used with angiographic embolization
>1990	Open Reduction and Internal Fixation	• Early fixation results in earlier ambulation and function

associated with long-term sexual function and few voiding difficulties.

ORIF of the pelvic fracture may be delayed due to management of other injuries and waiting for the systemic inflammatory response to subside. Flint et al. (2010) state the optimal window of opportunity for ORIF of the pelvic fracture is six days to two weeks post injury with a satisfactory result postoperatively in gaining pain-free walking for a majority of patients.

## Conclusion

Patients incurring severe pelvic trauma are at risk of hemorrhagic shock and this injury is also associated with

intra-abdominal injuries. The article review presents data on assessment of the injury, effective interventions to minimize complications and newer modalities up and coming to provide the best possible outcomes for patients.



## About the author

Margaret M. Dymond, RN, BSN, ENC(C), is a Clinical Nurse Educator, NCAC Western Canada

Representative,

TNCC/ENPC Instructor Trainer, CATN-II Course Director, University of Alberta Hospital, Edmonton, AB.

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outlook

Kids' Corner

# Oral sucrose for pain in B.C. Children's ED

By Sharron Lyons, RN

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Infants and pre-verbal children are at risk for inadequate pain relief because it is difficult to identify and assess their pain. Sweet-tasting solutions have been used for management of pain in infants for centuries and now there is a growing body of evidence that the combination of small amounts of liquid sucrose combined with sucking is an effective mild pain-reliever during short-term procedures such as IV starts, immunizations, heel/finger pokes, suture removal, dressing changes and some tube insertions.

A pilot project is underway at BC Children's Hospital to test this simple intervention. Since June 2010, staff has been encouraged to consider the use of 54% sucrose solution given in 0.2 ml portions (up to 2 ml) prior to, during and immediately after minor procedures.

Since sucking enhances the analgesic effect, the baby is offered a pacifier or the

breast between doses. Pain relief lasts five to eight minutes. The trial is ongoing and evaluations so far have been largely positive, with 64% of staff saying the sucrose worked very well for such procedures as urinary catheterizations, lumbar punctures, heel/finger pricks, and IV starts. Stay tuned for more articles on pain management in our youngest population in upcoming issues!

## About the author

Sharron is a registered nurse who has worked at the B.C. Children's hospital for more than 30 years—the last 21 years in the emergency department where she was involved in the disaster



program, and took the basic Light Urban Search & Rescue training, as well as CBRNE and Disaster Behavioural Health courses. During the Olympic/Paralympic games, Sharron worked on site in the Vancouver Village as a nursing supervisor.

Other part-time jobs have included teaching ENPC and CTAS around the province of B.C., and working with the RCMP 'E' Division and B.C. Crime Prevention Association.

She has been involved in volunteer work for many years. At present, her volunteer work includes the Representative for Children & Youth of B.C. (Investigations & Reviews Committee, 2006–2010), National Emergency Nurses Association 2005–2010, Centre Excellence in Emergency Preparedness 2006–2010, Emergency Nurses Association of B.C. (Board of Directors, 2004–2010).

Past volunteer work: Critical Incident Stress Management Team, BCCH 1987–2008, B.C. Crime Prevention Association 1985–2004, and Block Parent Program of Canada Inc., Director & Volunteer 1984–2002.

I look forward to working with a great team of emergency nurses from across Canada.