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EFFECTIVE USE OF BED SHEET AS PELVIC BINDER IN RESOURCE CONSTRAINT SITUATIONS

Surgery

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KEYWORDS

Pelvic Fracture, Pelvic binder

INTRODUCTION:

Pelvic fractures comprises of about 8-12% in blunt trauma patients[1,2] with a reported morbidity and mortality rates of 5-15%.[3] About 13% of patients with pelvic fractures present with shock.[4] They also pose specific challenge as they can have associated genitourinary or gastro-intestinal tract injury. Management of PFs is centred around haemodynamic stability of the patient. Aggressive resuscitation with external stabilisation of fracture holds key in management. In acute setting, pelvic binders are the 1st step in management of unstable pelvic fractures. Western Trauma Association guidelines for haemodynamically unstable pelvic fractures recommend use of pelvic compression device.[5] However, availability of customised pelvic compression devices in a middle- and low-income countries is of concern. Alibhai et al in 2016 reported availability of pelvic binders in MLIC and LMIC in pre-hospital setup as 28%, while in hospital availability was 49%, while it was 78% and 88% in high income countries.[6] This highlights the importance of utility of a bedsheet in closing the open pelvis in pelvic fractures. This is of essence in developing country where pre-hospital care is not developed and availability of pelvic binder is restricted. We present a case report of a haemodynamically unstable patient with open book pelvic fracture in which a bedsheet was effectively used as pelvic binder with a successful outcome.

Case Description:

A 24-year-old gentleman presented 4 hours after sustaining road traffic injury. On primary survey, he was in Class 3 Haemorrhagic shock with positive Pelvic Compression Test and crush injury of right lower limb (Mangled Extremity Severity Score – 8). His pelvic x ray showed open book pelvic fracture with a pubic diastasis of about 7.5cm (Young Burgess Classification: Antero-Posterior Compression Type 2 #) (Figure 1a). Rest of the adjuncts to primary survey were normal. Due to non-availability of customised pelvic compression device, a bedsheet was utilised as pelvic binder (Figure 2). Patient's haemodynamic responded to binder application, fluid resuscitation and Thomas splint application. Secondary survey was unremarkable. CECT torso did not revealed any other torso injuries. CECT abdomen however, also did not showed any pubic diastasis which was reduced completely by the bedsheet which was used as pelvic binder (Figure 1b). Patient underwent right sided above knee amputation with external fixation of pelvis. His post-operative course was uneventful. He was managed with external fixator of pelvis for 6 weeks. He was discharge on day 12th in good health.

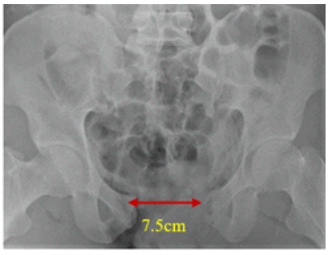

Figure 1a: X ray Pelvis showing Antero-posterior compression fracture with a pubic diastasis of 7.5cm

Figure 1b: CT pelvis (with application of pelvic binder) shows pubic symphysis of 0.5cm

Figure 2: Illustration showing bedsheet being used as pelvic binder

DISCUSSION:

Pelvic Circumferential Compression Devices in pre-hospital settings have been shown to shorter ICU and hospital stay and also decrease blood transfusion requirements.[7] Croce et al also established efficacy of pelvic binders in reducing blood transfusion requirements and improving outcomes in pelvic fractures.[8] Prasarn et al in a cadaveric study in 2013 showed that a simple sheet is as effective as customised pelvic compression device in unstable pelvic fractures.[9] Pelvic binders decrease fracture site bleeding, improves mechanical stability, decreases pain and prevents clot disruption. Grimm et al in 1998 performed pressure-volume study in pelvic fracture patients. They demonstrated that pelvic binders work by increasing the pressure in pelvis and thus occluding venous bleed, which is seen in 80% of pelvic fractures.[10] It has the maximum role in antero-posterior compression fractures with an open book fracture. The optimum site for application of pelvic binder is at the level of greater trochanter. Application of pelvic binder above the level of greater trochanters has been shown to delay recovery.[11] In 2012, Jain et al found that more than 1/3rd Emergency Department and orthopaedic registrars did not knew correct way to apply a pelvic binder.[12] Peyman et al from Sweden also found that in only 43 cases (59%) binders were applied fully correctly.[13] As such, it becomes important that paramedics and doctors are made aware of the correct position of application of binders. Multiple binder application has been advocated in few studies. In this technique, binder is also placed at thigh with knees and ankles taped together, so as to maintain internal rotation and maintaining stabilisation.[14] Lateral compression fractures are considered as contradiction for pelvic fracture. Krieg et al reported that it leads to slight over-reduction, however, it was not considered to be

significant.[15] Also, no study has been done till date which studies role of pelvic binders in lateral compression fractures. As such, in patients with haemodynamic instability due to pelvic fracture and in the absence of imaging, trial of pelvic binder can be given.

The case also highlights an important problem of whether to open the binder before getting a CT scan or not. Literature is very limited on this aspect, as opening the binder risks the patient becoming haemodynamically unstable. At the same time, definite extent of pelvic fracture cannot be ascertained as was seen in our case. We at our institution keep the binder applied for primary CT scan if patient was anytime in hypotension and repeat imaging with released binder is performed once we are sure that patient has been stabilised.

The case discussed above signifies that even if someone does not have tailor made PCCDs, they can simply use an available bedsheet to the best avail. This is of essence in a country like India, where pre-hospital care is still in primitive phase. However, prolonged application of pelvic binder is associated with skin necrosis and pressure sores. As such, it is recommended to remove the binder as soon as pelvic fixation is achieved or release it briefly every 24hrs.

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