DOI: 10.7860/JCDR/2026/87790.24503

Case Report

Orthopaedics Section

Bulbar Urethral Rupture with Sacral Fracture and Pubic Diastasis Managed by Orthopaedic Fixation and Conservative Catheterisation: A Case Report

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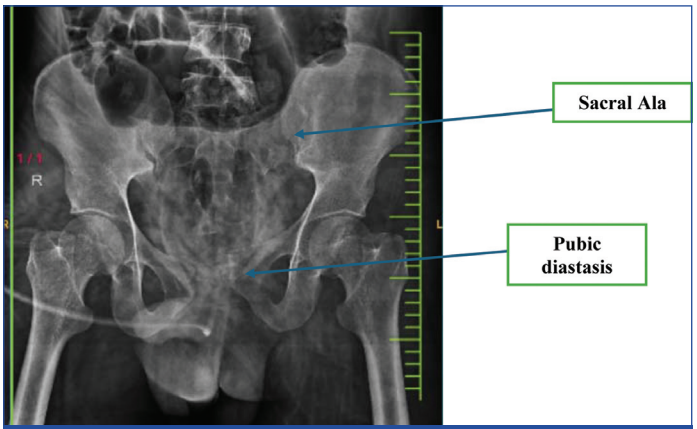
ABSTRACT

Pelvic crush injuries after road traffic accidents seldom present with the combination of bulbar urethral rupture, comminuted sacral fracture and pubic symphysis diastasis to form a complex pattern mandating coordinated multidisciplinary care even in resource-constrained environments. Hereby, the authors report a case of a 26-year-old male who presented to the Emergency Department after being crushed between a reversing truck and a wall with lower abdominal and inguinoscrotal trauma and acute urinary retention. Examination revealed perineal swelling with bilateral inguinal haematoma and tenderness. Initial urethral catheterisation attempts were unsuccessful. Contrast-Enhanced Computed Tomography (CECT) of the abdomen and pelvis with Three-Dimensional (3D) reconstruction revealed a bulbar urethra rupture, comminuted left sacral ala fracture extending to S5, and pubic symphysis diastasis, Tile Classification type C1. Definitive management included open reduction and internal fixation of the pubic diastasis with a pelvic reconstruction plate and screws, and sacral stabilisation with Iliosacral screw fixation. At the same time, the urethral injury was treated conservatively, with silicone Foley catheterisation. Postoperative recovery was uneventful, supported by structured physiotherapy and gradual mobilisation after an initial period of immobilisation. Timely surgical stabilisation of unstable pelvic fractures, combined with conservative catheter-based management of bulbar urethral rupture, can yield excellent early functional outcomes and may minimise long-term complications in patients.

Keywords: Fracture fixation, Pelvic fractures, Road traffic accidents, Urethral injuries

CASE REPORT

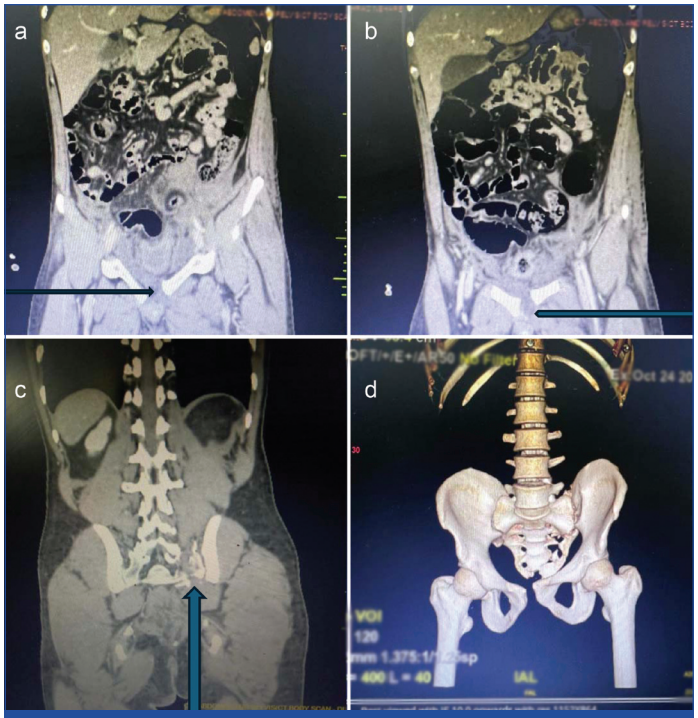
A 26-year-old male patient was brought to the Emergency Department after he was crushed between a reversing truck and a wall in Pulgaon, Wardha, Maharashtra, India, with high-energy blunt trauma to the lower abdomen and inguinoscrotal region, along with acute urinary retention. There was no history of loss of consciousness, head injury, bowel disturbance, or bleeding from the ears, nose, or throat. Upon arrival, urethral catheterisation with a 14F Foley catheter yielded no urine, even after flushing with 100 mL of normal saline. Aspiration yielded 20 mL of blood-tinged urine, after which a silicone Foley catheter was inserted. The general and neurovascular status of both lower limbs was preserved. The pelvic and hip examination showed swollen overlying skin with bilateral inguinal haematomas, local warmth, and marked tenderness, with no active bleeding, discharge, sinus formation, or blood at the urethral meatus; the scrotum was intact. The pelvic compression test was positive; however, hip and knee ranges of motion could not be elicited active pain. Active ankle and toe movements, sensations, and dorsalis pedis and posterior tibial pulses were palpable bilaterally. Preoperative anteroposterior radiograph of pelvis and both hips showed disruption of the pelvic ring with pubic symphysis diastasis and sacral involvement, Tile Classification type C1 as shown in [Table/Fig-1].



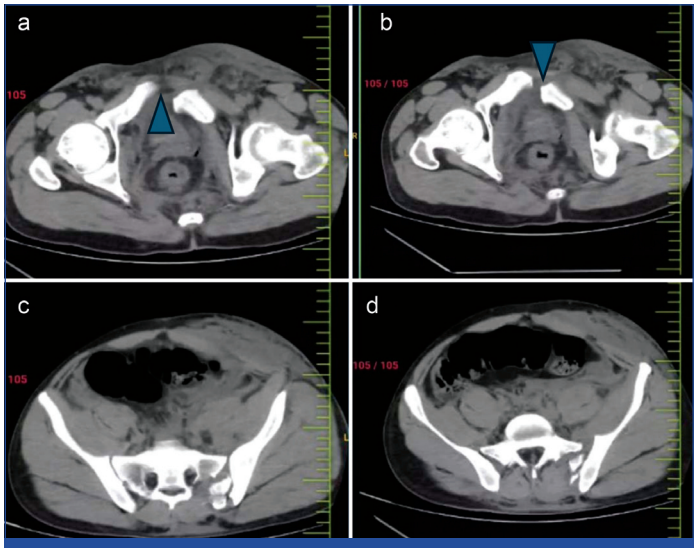
[Table/Fig-1]: Anteroposterior view of pelvis and hips showing pubic diastasis and sacral ala fracture left-side consistent with an unstable pelvic ring injury (Tile C1).

The CECT of the abdomen and pelvis with 3D reconstruction confirmed a complex injury pattern comprising bulbar urethral rupture with contrast extravasation, comminuted fracture of the left sacral ala extending to S5 and pubic symphysis diastasis, as shown in [Table/Fig-2a-d]. Axial CT images of the abdomen and pelvis demonstrating pubic symphysis diastasis anteriorly and a left-sided sacral fracture involving the sacral ala, Tile classification Type C1 [Table/Fig-3a-d]. Initial stabilisation included proximal tibial skeletal traction with a Steinmann pin on the left-side and pelvic binder application. Preoperative investigation was done which was Haemoglobin-13.8 g/dL, White Blood Cells (WBC)-22,400 cells/mm^3, International Normalised Ratio (INR)-1.1, Urea-37 mg/dL, Creatinine-2.05 mg/dL, Activated Partial Thromboplastin Time (APTT)-30.3 seconds, Prothrombin Time-13.1 seconds, injury severity score of 16 (Severe). After anaesthetic clearance, definitive management was undertaken. Through a Pfannenstiel incision under combined spinal-epidural anaesthesia, open reduction and internal fixation of the pubic symphysis diastasis was performed using a six-hole pelvic reconstruction plate with cortical screws (50×2 mm and 40×2 mm) and cortical screws (4×40×2 mm); intraoperative photography documented accurate plate positioning as shown in [Table/Fig-4].

The patient was then positioned in lateral decubitus position for a posterior (Moore) approach to the pelvis, and the left sacral fracture was stabilised with a partially threaded 4.5 mm×80 mm and a



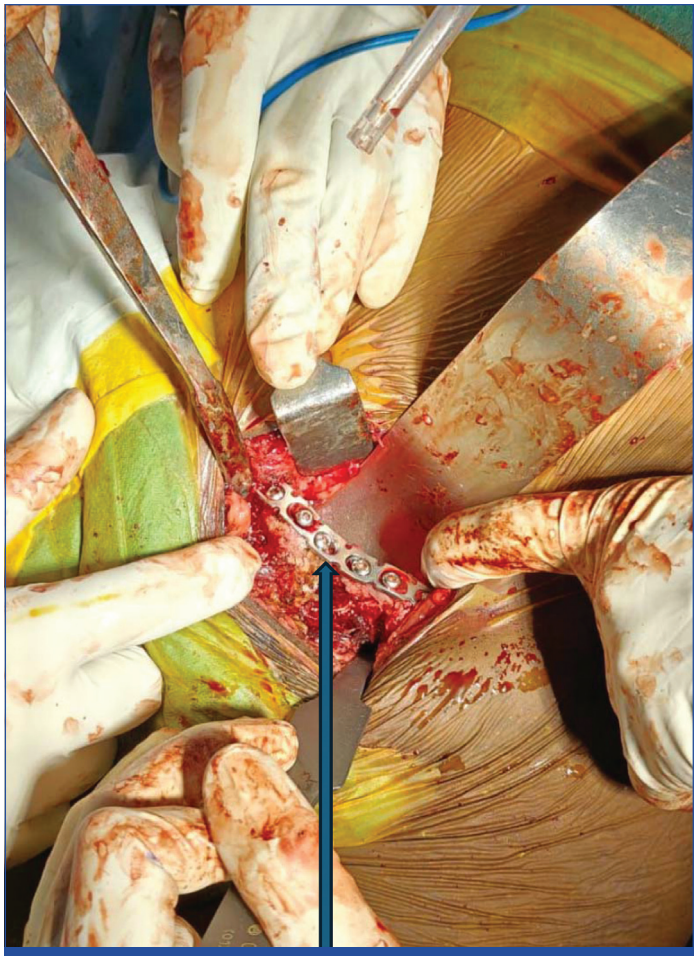
[Table/Fig-2]: Contrast-Enhanced CT (CECT) scan of the abdomen and pelvis with 3D reconstruction demonstrating pubic symphysis diastasis and a comminuted fracture of the left sacral ala extending toward the S5 vertebra, confirming unstable pelvic ring disruption; a) CT Abdomen and pelvis coronal view showing pelvic diastasis; b) CT abdomen and pelvis coronal view showing pelvic diastasis; c) Sacral ala fracture left side CT abdomen pelvis coronal view; d) CT abdomen and pelvis with 3D reconstruction showing pubic diastasis and sacral ala fracture extending to S5 vertebrae.



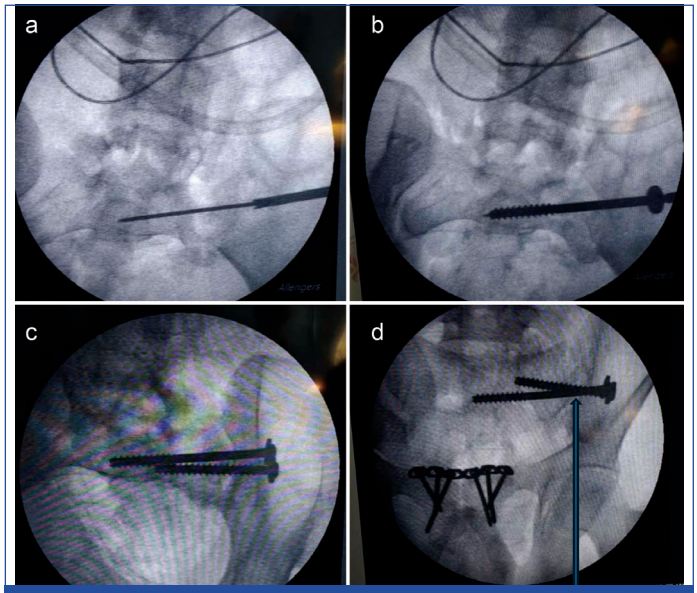
[Table/Fig-3]: Axial CT images of the pelvis demonstrating anterior pelvic ring disruption with pubic symphysis diastasis and posterior pelvic ring injury involving the left sacral ala; a) CT pelvis axial view showing pubic diastasis; b) CT pelvis axial view showing pubic diastasis; c) CT pelvis axial view showing sacral ala fracture left-side; d) CT pelvis axial view showing sacral ala fracture left-side.

fully threaded 4.5 mm×50 mm Cannulated Cancellous (CC) screw under fluoroscopic guidance, sequential images capturing guide wire placement, screw insertion and final construct are as shown in [Table/Fig-5a-d]. Bladder integrity was intraoperatively assessed by instilling methylene blue dye through the urethral catheter and inspecting the pelvis; absence of dye leak excluded gross bladder rupture. Both procedures were uneventful, and the distal neurovascular status remained intact at the end of surgery.

Postoperative radiographs of the pelvis and both hips in anteroposterior and lateral/oblique views confirmed satisfactory reduction of the pelvic ring, restoration of alignment of the pubic symphysis and appropriate positioning of screws in the sacrum as shown in [Table/Fig-6a-c]. The patient received intravenous ceftriaxone and amikacin for five and three days, respectively, along with tranexamic acid for haemostasis,



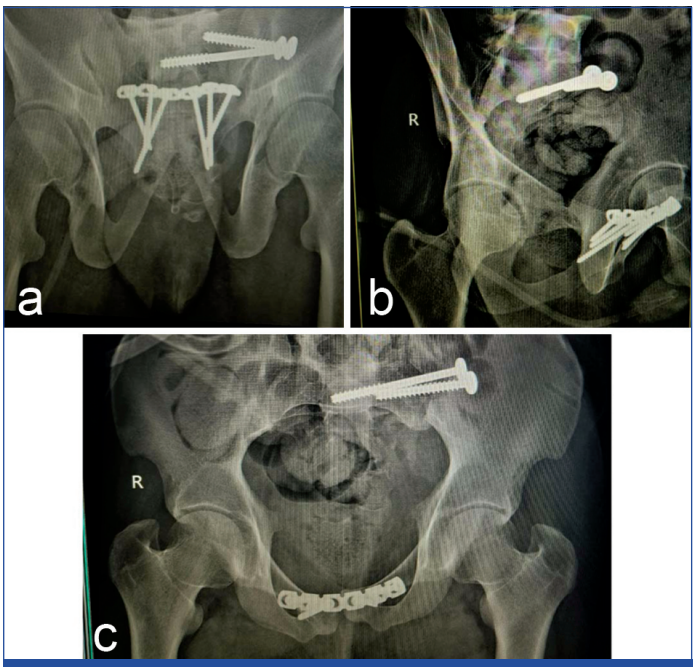
[Table/Fig-4]: Intraoperative photograph obtained through a Pfannenstiel incision showing open reduction and internal fixation of pubic symphysis diastasis using a pelvic reconstruction plate and cortical screws.



[Table/Fig-5]: Sacral ala fracture fixation with sacro-iliac screw under fluoroscopy; a) Guide wire placement for provisional reduction of sacral ala fracture; b) Partially threaded cannulated screw with washer passed over guide wire; c) Iliosacral Screw fixation under fluoroscopy with fully and partially threaded CC screw with washer; d) Recon plate fixation and iliosacral screw fixation under fluoroscopy.

thiamine supplementation, pantoprazole for gastroprotection, and paracetamol with tramadol as required for analgesia. Additionally, the patient received oral rifaximin, ursodeoxycholic acid, calcium, and vitamin C. He was maintained on strict bed rest with a structured physiotherapy regimen comprising ankle pumps, static quadriceps and hamstring exercises and pelvic thrusts; sutures were removed on postoperative day 14. The bulbar urethral rupture was managed conservatively with a silicone Foley catheter kept in situ for one month, and on discharge while haemodynamically stable with healthy wounds

he was prescribed oral antibiotics (levofloxacin and cefixime-linezolid), analgesic-anti-inflammatory combination therapy, gastroprotection and supplements, with advice to continue exercises at home and review after four weeks for clinical, radiological and urological reassessment.



[Table/Fig-6a-c]: X-ray of pelvis and both hips outlet view, lateral and inlet view. Postoperative radiographs of the pelvis demonstrating satisfactory reduction of the pelvic ring with reconstruction plate fixation of the pubic symphysis and stable sacral screw placement

Chronological overview of the patient's injury, diagnostic evaluation, surgical intervention, and postoperative care. The table summarises key events from initial presentation following high-energy pelvic crush trauma to definitive fixation, conservative management of associated bulbar urethral rupture, and planned follow-up, highlighting the coordinated multidisciplinary approach and sequential recovery milestones as shown in [Table/Fig-7].

Time point	Key events
Day 0-Injury and ED presentation	High-energy pelvic crush injury between a reversing truck and wall; lower abdominal and inguino-scrotal trauma with acute urinary retention; no loss of consciousness or associated head, bowel, or ENT injury.
Day 0-Initial urologic evaluation	Failed 14F Foley catheterisation despite saline flush; aspiration yielded blood-tinged urine; silicone Foley catheter inserted.
Day 0-Imaging	CECT abdomen-pelvis with 3D reconstruction demonstrated bulbar urethral rupture, comminuted left sacral fracture (ala to S5), and pubic symphysis diastasis.
Day 0-Temporary stabilisation	Pelvic binder application and left proximal tibial skeletal traction using a Steinmann pin.
Day 1-Definitive surgical management	ORIF of pubic symphysis via Pfannenstiel approach and fixation of left sacral fracture with cannulated cancellous screws; intra-operative methylene blue test negative for bladder injury.
Postoperative days 1-14	Uneventful postoperative recovery with antibiotics, analgesia, early in-bed physiotherapy; suture removal on Day 14.
1-month post-injury	Conservative management of bulbar urethral rupture with a silicone Foley catheter maintained for one month.
4 weeks post-surgery	Scheduled follow-up with clinical, radiological, and urological reassessment.

[Table/Fig-7]: Timeline of clinical events and management. ENT: Ear, nose, and throat; ORIF: Open reduction and internal fixation

The postoperative management plan included an organised pharmacological and rehabilitative regimen to support healing. [Table/Fig-8] summarises the in-hospital drugs used during the first few hours of the operation, and [Table/Fig-9] lists the discharge medication regimen to continue managing the patient as an outpatient. Furthermore, a planned program of staged physiotherapy and mobilisation to prevent deconditioning and encourage incremental functional recovery was introduced, as outlined in [Table/Fig-10].

Drug	Dose	Duration
Ceftriaxone (i.v.)	1 g twice daily	5 days
Amikacin (i.v.)	750 mg once daily	3 days
Tranexamic acid (i.v.)	500 mg three times daily	3 days
Thiamine (i.v.)	100 mg once daily	5 days
Pantoprazole (i.v.)	40 mg once daily	3 days
Paracetamol (i.v.)	1 g (in 100 mL) twice daily	5 days
Tramadol (i.v.)	2 mL in 100 mL normal saline, as required	Postoperative period
Rifaximin (oral)	400 mg once daily	5 days
Ursodeoxycholic acid (oral)	500 mg once daily	5 days
Calcium (oral)	500 mg once daily	5 days
Vitamin C (oral)	500 mg twice daily	5 days

[Table/Fig-8]: In-hospital medications.

Drug	Dose	Duration
Ursodeoxycholic acid (oral)	500 mg once daily	14 days
Calcium (oral)	500 mg once daily	14 days
Vitamin C (oral)	500 mg twice daily	14 days
Levofloxacin (oral)	400 mg twice daily	7 days
Aceclofenac+Serratiopeptidase+ Paracetamol (oral)	100 mg+15 mg+325 mg twice daily	7 days
Pantoprazole (oral)	40 mg once daily	14 days
Cefixime+Linezolid (oral)	200 mg+600 mg twice daily	7 days

[Table/Fig-9]: Discharge medications.

Phase	Physiotherapy intervention	Frequency/ duration	Activity level
In hospital (post op Days 1-14)	Ankle pump exercises	Several sets daily throughout hospital stay	Strict bed rest with in-bed exercises only.
In hospital (post op Days 1-14)	Static quadriceps exercises	Several sets daily	No hip/knee ROM due to pain; focus on isometrics.
In hospital (post op Days 1-14)	Static hamstring exercises	Several sets daily	Maintains muscle tone and venous return.
In hospital (post op Days 1-14)	Pelvic thrusts (bridging type activation within pain limits)	Once or twice daily under supervision	Early core and pelvic stabilisation while supine.
Early post-discharge (first 4 weeks)	Continuation of ankle pumps	Daily home programme	Gradual progression to supported ambulation as tolerated.
Early post-discharge (first 4 weeks)	Continuation of static quadriceps and hamstring exercises	Daily home programme	Prevents deconditioning and supports later weight bearing.
Early post-discharge (first 4 weeks)	Continuation of pelvic thrust exercises	Daily home programme	Aids pelvic stabilisation and gait training.

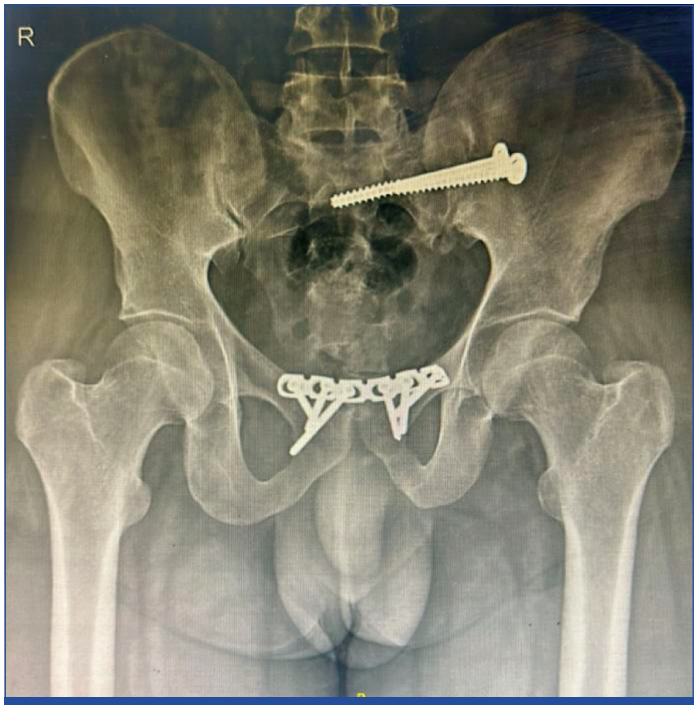
[Table/Fig-10]: Physiotherapy protocol and mobilisation plan.

Follow-up and Outcome

During follow-up at four weeks, the patient complained of a gradual decrease in pelvic pain, and could walk with support and continue the prescribed home-based physiotherapy programme, which included ankle pumps, stationary quadriceps and hamstrings exercises, and pelvic thrusts. On clinical examination, the Pfannenstiel and posterior incisions were healed and infection-free; distal neurovascular status in both lower limbs was preserved; and no new urological or neurological complaints. The silicone Foley catheter was scheduled for removal after one month of indwelling drainage, and a urological review with imaging was to be performed to assess urethral continuity and bladder

integrity. Continence, voiding and sexual health outcomes will be evaluated by long-term follow-up.

By one month postoperative, the patient was permitted to do some weight bearing with the use of walker as radiological evaluation revealed stable pelvic fixation and satisfactory clinical outcome as shown in [Table/Fig-11].



[Table/Fig-11]: One-month follow-up after surgery anteroposterior view radiograph of pelvis and both hips showing pubic diastasis fixation with recon plate and sacral ala fracture fixation using iliosacral screws.

DISCUSSION

Pelvic fractures associated with urethral injury most often involve posterior distraction or shear at the prostatomembranous junction [1]. The coexistence of pubic symphysis diastasis, comminuted sacral ala fracture, and isolated bulbar urethral rupture, as noted in this patient, is decidedly uncommon [2]. The high-energy crush mechanism likely generated anteroposterior compression with superimposed shear forces, resulting in circumferential disruption of the pelvic ring and transmission of force to the anterior urethra [3]. This injury pattern emphasises maintaining a high index of suspicion for lower urinary tract injury in complex pelvic trauma, even in the absence of blood at the urethral meatus.

Accurate delineation of osseous and urological injuries is essential for optimum management. While retrograde urethrography remains the diagnostic gold standard for pelvic fracture urethral injuries, CECT is often the first-line investigation in polytrauma settings [4]. In the present case, CECT of the abdomen and pelvis with three-dimensional reconstruction enabled the rapid identification of pelvic ring disruption and contrast extravasation consistent with a bulbar urethral rupture, thereby facilitating coordinated orthopaedic and urological planning. Intraoperative methylene blue testing further excluded associated bladder injury.

Early stabilisation of the pelvic ring is a cornerstone in the management of unstable pelvic fractures. Contemporary trauma protocols support temporary mechanical stabilisation with subsequent definitive fixation when haemodynamic stability is achieved [5]. Initial skeletal traction and pelvic binder application in this patient were followed by circumferential internal fixation: reconstruction plating of the pubic symphysis and posterior sacral stabilisation by CC screws. This approach restored pelvic stability, allowed for early pain control, and enabled structured rehabilitation without compromising neurovascular function [6]. Management of the urethral injury was individualised based on the segment involved and the absence of posterior urethral or bladder neck disruption. Kulkarni SB et al., reported that complex and redo Pelvic Fracture Urethral Injury (PFUI) often require multistage urethral reconstruction, as the stricture burden is particularly high once dense scarring develops [7]. Conversely, this case represents a first-episode bulbar urethral rupture managed conservatively with simple catheter drainage, thereby potentially avoiding late reconstructive morbidity. Additionally, Joshi PM et al., provided an updated PFUI framework, which primarily addressed posterior injuries. In contrast, the present case demonstrated how urethral segment involvement and pelvic stability permit deviation from the standard algorithm towards less invasive management [8]. From the orthopaedic point of view, Liu L et al., proved that unstable Tile C-type pelvic fractures benefit from combined anterior and posterior ring stabilisation, supporting the biomechanical rationale for pubic symphyseal plating with sacral screw fixation used in this case [9]. Dabetic U et al., underlined modern pelvic trauma algorithms with early binder use, resuscitation, and timely transition to definitive fixation, which closely resembled the sequence of management followed [10]. Horiguchi A, emphasised the importance of suprapubic diversion with delayed urethroplasty or early endoscopic realignment for typical posterior PFUI; however, conservative Foley catheterisation, without suprapubic cystostomy, is considered an accepted option in selected cases of anterior urethral trauma, as applied here under close follow-up [11], a few case reports have described urogenital injuries associated with pelvic fractures. Shin HK et al., documented a pelvic fracture, with full disruption of the posterior urethra that was successfully treated using suprapubic cystostomy and later spontaneous urethral recanalisation [12]. Stenquist DS et al., reported a case of bladder entrapment in a pelvic fracture in a ring that needed surgical debridement and internal fixation [13]. In a similar case, Alfayez SM et al., mentioned the rupture of the bladder as a result of a displaced fragment of the pelvic bone that needed surgery [14]. In a different study, Saleh MH et al., emphasised a multidisciplinary approach to an open-book pelvic fracture with final pelvic fixation [15].

In summary, the present case illustrates that selected patients with high-energy pelvic fractures and isolated bulbar urethral rupture can be safely treated with early circumferential pelvic stabilisation and conservative catheter-based urethral management. Close follow-up remains necessary for the eventual delayed urethral stricture or functional sequelae, but may provide an excellent early outcome while reducing further surgical morbidity.

CONCLUSION(S)

The present case shows that combined pubic diastasis; sacral ala fracture and bulbar urethral rupture may be effectively treated with timely pelvic fixation and urinary catheterisation using conservative catheters. Timely imaging with CT and 3D reconstruction enabled accurate diagnosis and facilitated appropriate surgical fixation. Bulbar urethral injury was managed in conservative manner, thereby preventing need for urethral surgery and achieving a good early functional outcome.

Acknowledgement

The authors would like to acknowledge the orthopaedics, urology, anaesthesia, radiology, and physiotherapy teams of the treating hospital for their contribution toward patient care and documentation.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 13, 2026
- Manual Googling: Jun 13, 2026
- iThenticate Software: Jun 15, 2026 (6%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jan 28, 2026**
Date of Peer Review: **Mar 16, 2026**
Date of Acceptance: **Jun 17, 2026**
Date of Publishing: **Oct 01, 2026**