



## Case Report

## Initial reduction with nonabsorbable polyester for a widely disrupted pubic symphysis with perineal involvement

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## ABSTRACT

An 18-year-old male sustained a huge open fracture of the pubic symphysis combined with perineal trauma in a motor vehicle accident. Physical examination in our emergency department revealed a huge contaminated deep perineal open wound about 15 cm in length with rectal perforation. The radiographs showed an open book fracture (Type B1) of the pubic symphysis 9 cm in length, fracture of the left femoral middle shaft, and fracture of the left radius. After fluid administration and blood transfusion, the patient underwent a diverting colostomy, wide debridement, and reduction of the pubic symphysis with two figure-of-eight sutures of nonabsorbable polyester. This fixation option was easily and quickly applied, and had adequate strength for rehabilitation. The infection in the pelvis was regional and well controlled after antibiotic treatment. The functional outcome showed that the patient was satisfied with pain relief, and there was good bone healing and weight-bearing ambulation.

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## 1. Introduction

Separation of the pubic symphysis is a common injury to the pelvis resulting from anteroposterior or lateral compression or from direct trauma to the pubis. Pelvic fracture with involvement of the retroperitoneal and perineal space can be life-threatening because of vascular injury, hemorrhage, or infection. An immediate diverting colostomy is indicated in patients with perineal wounds. Several materials have been reported effective in stabilizing a symphyseal disruption, including double-plating fixation, wire loops, and absorbable and nonabsorbable suture materials. We report a double figure-of-eight suture method with nonabsorbable polyester for pubis symphysis diastasis which led to a satisfactory functional outcome.

## 2. Case report

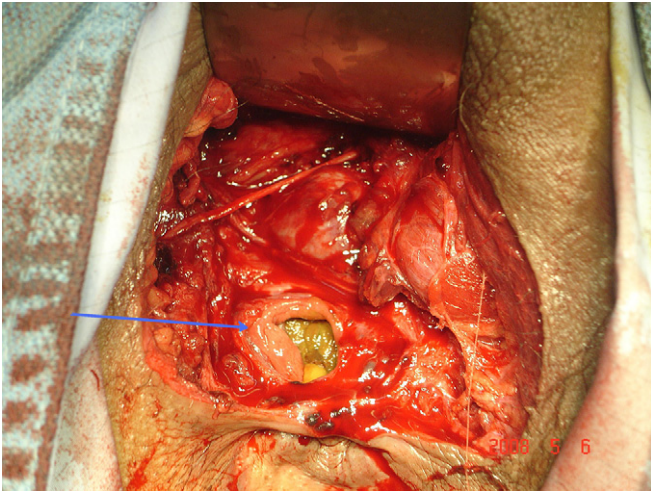
An 18-year-old man who was riding a motorcycle under the influence of alcohol ran into a fire hydrant at night. The force of the impact rammed the fire hydrant into his buttocks. He was sent to

our emergency department by ambulance. His pulse rate was 95 beats per min, and blood pressure 92/57 mmHg. His hemodynamic status stabilized after blood transfusion and administration of intravenous fluids. The physical examination found one deep perineal wound about 15 cm in length with testis exposure, corpus spongiosum and prostate capsule contusions, a left corpus cavernosum laceration, and rectal perforation with stool contamination (Fig. 1). In addition, he had a left inguinal laceration about 20 cm in length parallel to the inguinal ligament, and multiple abrasions on the right side of his face and chin. The radiographs showed an open book fracture (Type B1) of the pubic symphysis 9 cm in length (Fig. 2), fracture of the left femoral middle shaft, and fracture of the left radius. An ultrasound examination showed no hemoperitoneum or hemothorax. Abdominal computed tomography revealed no evidence of bladder rupture or hemoperitoneum. The initial impression of the patient included: 1) a 9-cm disrupted pubic symphysis; 2) a deep, contaminated perineal laceration (15 cm) with rectal perforation (2 cm over the anal verge) and left corpus cavernosum laceration; 3) left proximal third femoral shaft fracture; 4) left distal radius fracture; and 5) corpus spongiosum and prostate contusions.

We first performed perineal wound debridement and repair of the left corpus cavernosum. Then, the patient underwent a T-loop colostomy and repair of the large perineal laceration and rectal perforation. The widened pubis symphysis was then reduced by

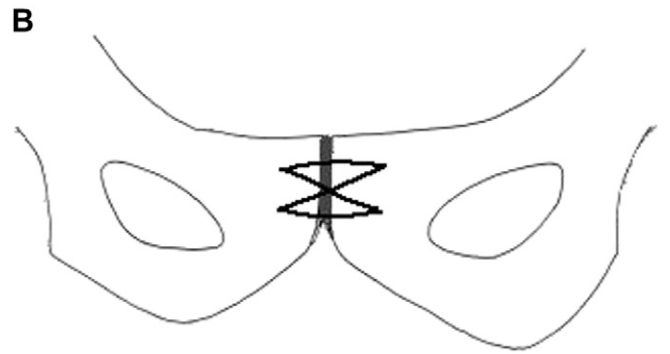
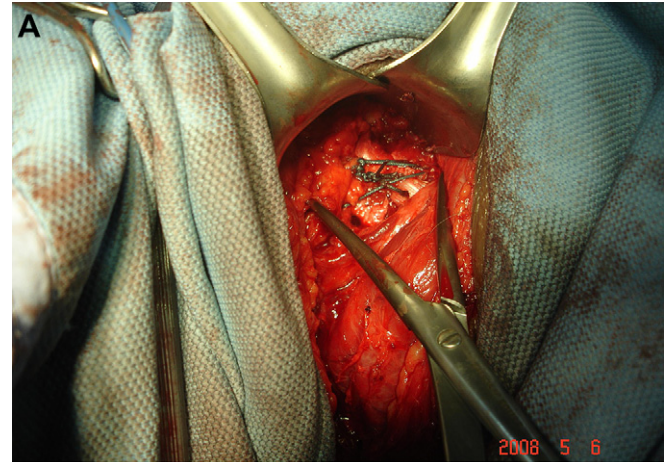
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**Fig. 1.** A large laceration with perineal involvement, rectal perforation, and stool contamination (blue arrow) in an 18-year-old male following a motor vehicle accident; the disrupted pubic symphysis cannot be seen.

a bone clamp and repaired using two figure-of-eight sutures placed through the cartilaginous pubis with two No. 5 Ethibond sutures (Ethicon, Auneau, France) (Figs. 3A and 3B). Postoperative radiographs showed good reduction of the pelvis (Fig. 4). The perineal wound culture grew *Enterobacter cloacae* and coagulase-negative *Staphylococcus* species. The infection was controlled after intravenous antibiotic treatment and three wound debridements. We performed open reduction and internal fixation of the left proximal third femoral shaft fracture and left distal radius fracture 2 weeks later. The patient could mobilize with a wheelchair in the first month, and then started partial weight-bearing ambulation with crutch assistance. He could ambulate without any assistance 6 months after the operation. After 2 years of follow-up, all implants had been removed and pelvic radiography showed good bone healing without limping or osteomyelitis (Fig. 5). He had a satisfactory functional

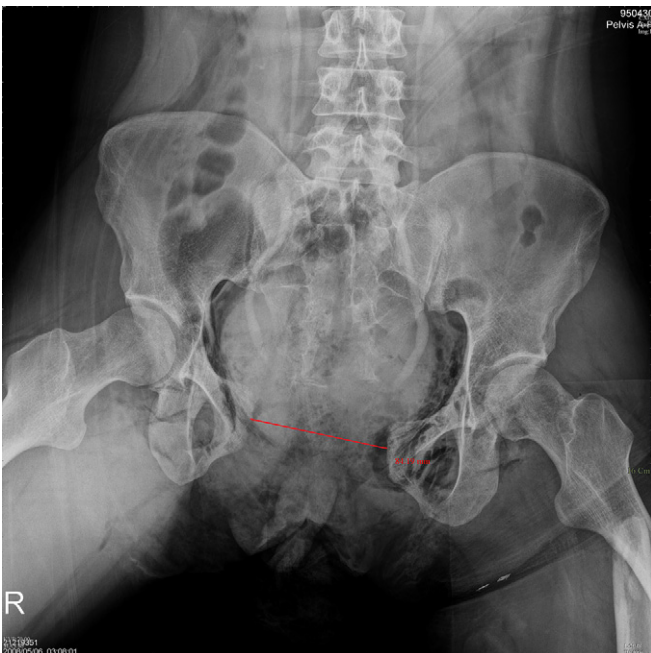


**Fig. 3.** Disrupted pubic symphysis (A) after reduction by bone clamping and (B) sutured by the double figure-of-eight suture method with No. 5 Ethibond (nonabsorbable polyester).

status without pelvic pain or limping, and could resume his work as a bus driver without disability.

### 3. Discussion

Petersen et al.<sup>1</sup> reported that an unstable pubic symphysis diastasis or diastasis greater than 40 mm requires surgical intervention



**Fig. 2.** A pelvic anteroposterior radiograph shows a widely separated, open book fracture 84.19 cm in length and a left femoral shaft fracture (red solid arrow).



**Fig. 4.** A postoperative anteroposterior radiograph shows good reduction of the pubic symphysis.



**Fig. 5.** Radiography at 2 years' follow-up shows minimal displacement ( $<1$  cm) of the pubic symphysis.

to preserve the integrity of the pubic symphysis joint. The two optimal methods for surgical intervention of the disrupted pubic symphysis are internal fixation and external fixation. The internal fixation devices (plates, wire looping, screws, nonabsorbable and absorbable suture materials) can provide rigid fixation<sup>2,3</sup> and allow satisfactory pain relief and early ambulation. For patients with open pelvic fracture or abdominal injury with peritoneal contamination, external fixation devices (anterior fixation or posterior pelvic C-clamping) offer the advantages of rapid and easy application, minimal additional soft tissue trauma, and a minimized infection rate. Reported complications of external fixation include inadequate strength for rigid fixation, malunion or nonunion, pin tract irritation or infection, loosening of the pins, injury to the lateral femoral cutaneous nerve, and pressure sores.

It is reported that braided nonabsorbable polyester sutures provide adequate strength for fixation of fractures of the shoulder, proximal humerus, and patella. Varga et al<sup>4</sup> compared the effects of three methods of internal fixation of a symphysis diastasis, namely double plating (4.5 mm reconstruction plates), wire loops around two 6.5 mm, fully threaded cancellous screws, and an absorbable suture material (polydioxanone). Eight unembalmed cadaveric pelvises were tested in a position simulating bilateral stance in a servohydraulic materials-testing machine. They found that the wire looping method allowed significantly less symphyseal motion than braided absorbable and nonabsorbable suture materials. Harrell et al<sup>5</sup> compared the tensile properties of 18-gauge stainless steel wire, 5-mm woven polyester (Mersilene) tape, and different loop configurations of No. 5 braided polyester suture (Ethibond). They reported that multiple loops of Ethibond can substitute for stainless steel wire, but may not be satisfactory for rigid fixation (tension band fixation of a fracture). Najibi<sup>6</sup> compared three types of braided nonabsorbable (Nos. 2 and 5 FiberWire [Arthrex, Naples, FL, USA]; Nos. 0, 1, 2, and 5 Ethibond Excel [Ethicon, Somerville, NJ, USA]; and Numbers 2 and 5 TiCron [Sherwood-Davis & Geck,

St Louis, MI, USA]) and one type of braided absorbable suture material with different calibers (Numbers 2-0, 0, and 1 Vicryl [Ethicon]). All samples were tied by one surgeon with one Seoul medical center knot and three square knots. They found that the No.5 FiberWire had highest maximum load to failure and stiffness (load to failure 620 N, stiffness 62 N/mm). The No. 5 Ethibond (load to failure 247 N, stiffness 25 N/mm) has higher strength than No. 1 Vicryl (load to failure 130 N, stiffness 15 N/mm).

Harminder et al<sup>7</sup> reported that stainless metal wires resulted in a higher infection rate than non-absorbable suture material. However, the nonabsorbable suture materials still have potential bacterial adherence potential. Local pelvic infection was noted in our patient and was controlled successfully after antibiotic treatment and surgical debridement. There are several advantages of this technique. First, the taper-cut needle can easily and quickly penetrate the pubic symphysis and knots can be tied with two figure-of-eight sutures. The operation time was around 20 min. Second, this direct suture technique is adequate for fixation of the simple open-book pubic symphysis diastasis and the loading for initial bedside rehabilitation and wheelchair ambulation. Third, there is also no need for pin care in this technique, which minimizes the possibility of pin tract irritation and infection.

We conclude that for acute management of widely disrupted pubic symphyses and perineal involvement, figure-of-eight sutures with nonabsorbable polyester offers another option. However, in patients with comminuted pelvic fracture (such as anteroposterior compression type III fracture with rotational and vertical instability), our technique may not be able to provide adequate strength.

#### 4. Conclusion

The figure-of-eight suturing technique with nonabsorbable material for open-book pubic symphysis diastasis with perineal contamination is an easy and rapid option that can give a satisfactory result in certain limited circumstances, as in our case. Nonabsorbable materials still have a potential infection risk. In addition, more experience is required to assess the optimal tension strength around the pubic symphysis during weight-bearing activities.

#### References

1. A.C. Petersen, K.L. Rasmussen. External skeletal fixation as treatment for total puerperal rupture of the pubic symphysis. *Acta Obstet Gynecol Scand* 71 (1992) 308–310.
2. A.G. Urquhart, E.P. Frankenburg, D.A. Bloom, R.T. Loder. Pubic symphysis repair strength in simulated bladder exstrophy using a sheep model. *Urology* 52 (1998) 336–340.
3. E.L. Flatow, F. Cuomo, M.G. Maday, S.R. Miller, S.J. McIlveen, L.U. Bigliani. Open reduction and internal fixation of two-part displaced fractures of the greater tuberosity of the proximal part of the humerus. *J Bone Joint Surg Am* 73 (1991) 1213–1218.
4. E. Varga, T. Hearn, J. Powell, M. Tile. Effects of method of internal fixation of symphyseal disruptions on stability of the pelvic ring. *Injury* 26 (1995) 75–80.
5. R.M. Harrell, J. Tong, P.S. Weinhold, L.E. Dahners. Comparison of the mechanical properties of different tension band materials and suture techniques. *J Orthop Trauma* 17 (2003) 119–122.
6. S. Najibi, R. Banglmeier, J.M. Matta, M. Tannast. Material properties of common suture materials in Orthopaedic surgery. *Iowa Orthop J* 30 (2010) 84–88.
7. H.S. Gosal, P. Singh, R.E. Field. Clinical experience of patellar fracture fixation using metal wire or non-absorbable polyester — a study of 37 cases. *Injury* 32 (2001) 129–135.