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Case Report

Endoscopically assisted implant removal of a symphyseal pelvic plate - A case report

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ABSTRACT

Introduction: The approach-related morbidity rate in the care of pelvic fractures is still high. Endoscopic procedures are known to significantly reduce access-related complications. Recently, a new endoscopically assisted implantation technique for plate osteosynthesis on the anterior pelvic ring has been described as the “*Endoscopic Approach to the Symphysis*”.

Case report: We present a case of a 29-year old male with a pelvic injury (AO type 61B2.3a) initially treated with a supraacetabular external fixator. After one week the definitive stabilization was performed by an endoscopically assisted symphyseal plating as well as a percutaneous iliosacral screw on the right side. One year after primary surgery, we performed an endoscopically assisted removal of the symphyseal plate using standard laparoscopic instruments.

Results: We demonstrate the feasibility of an endoscopically assisted implant removal at the anterior pelvic ring. No complications occurred during the procedure. The patient was discharged after a regular time of surveillance and with an adequate decline of pain.

Discussion: While we were able to show that the endoscopically assisted implantation as well as the removal of a plate osteosynthesis on the anterior pelvic ring is possible, there is still further research necessary, especially regarding the development of specific endoscopic instruments. This should enable operating times similar to the standard open procedures.

Introduction

The incidence of pelvic ring fractures is about 2–8% of all fractures, in polytrauma patients however they occur in up to 25% of the cases [1]. The most common approaches for the surgical treatment of the anterior pelvic ring are the modified Pfannenstiel approach [2] and the modified Stoppa approach [3]. Possible complications include urinary bladder injuries, incisional hernias, neurovascular injuries, wound healing disorders, and wound infections [4]. Complication rates of up to 30% are described for the surgical treatment of dislocated pelvic ring fractures [5]. Minimally invasive surgical procedures can significantly reduce these approach-related complications [6]. To the best of our knowledge, we describe the first case of an endoscopically assisted implant removal on the anterior pelvic ring.

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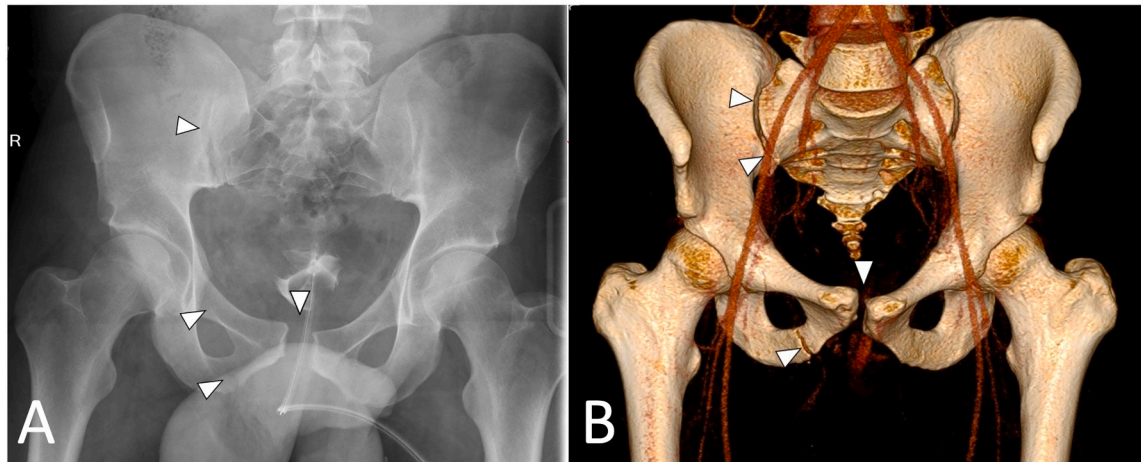


Fig. 1. Initial (A) X-ray and (B) CT scan of the pelvic injury. It shows an open book injury with a rupture of the symphysis, fracture of the inferior and superior pubic ramus and minor dislocation in the sacroiliac joint (arrows) AO type 61B2.3a.

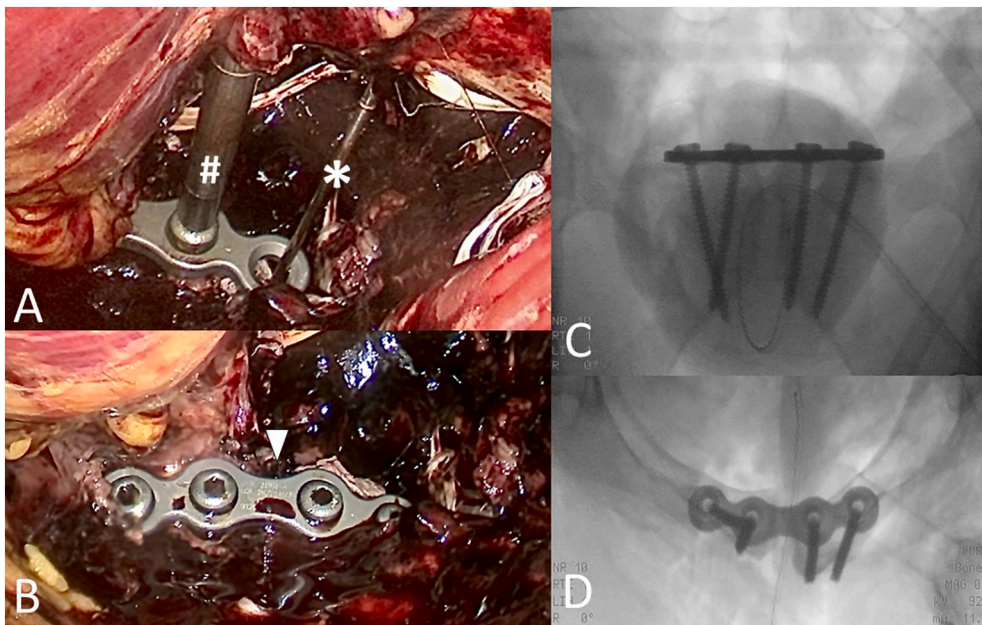


Fig. 2. Intraoperative site. (A) Percutaneous fixation of the plate with a Kirschner wire (*). Screw fixation through the suprasymphyseal trocar (#). (B) Endoscopic view at the plate osteosynthesis stabilizing the symphysis (arrow). (C) Intraoperative X-ray imaging showing the sufficient reduction of the symphyseal luxation, adequate length and alignment of the screws and (D) the correct positioning of the plate.

Case presentation

A 29-year-old man was delivered to our emergency department after a motorcycle accident. A computed tomography (CT) scan and X-ray showed a polytrauma pattern of injuries including a rupture of the pubic symphysis as well as a dislocation of the right sacroiliac joint (Fig. 1), classified as AO type 61B2.3a. Because of the vertical dislocation in the symphyseal diastasis the injury was initially classified as a type C injury. Therefore both, a dorsal and a ventral stabilization was planned. After initial stabilization of these injuries with a supraacetabular external fixator the patient underwent an endoscopically assisted implantation of a symphyseal plate as well as a percutaneous sacroiliac screw fixation on the right side (Fig. 2). The procedure was performed according to a recently described technique called “EASY – Endoscopic Approach to the Symphysis” [7]. Since the patient also suffered from a spinal cord injury he was hospitalized for three months. His neurological symptoms were decreasing over time, so he could be discharged without any resolving symptoms. Outpatient clinical and radiological follow-ups were carried out one year after the accident. The patient complained about pain in his right gluteal and sacroiliac region, especially after long walks or long periods of sitting. He had no specific

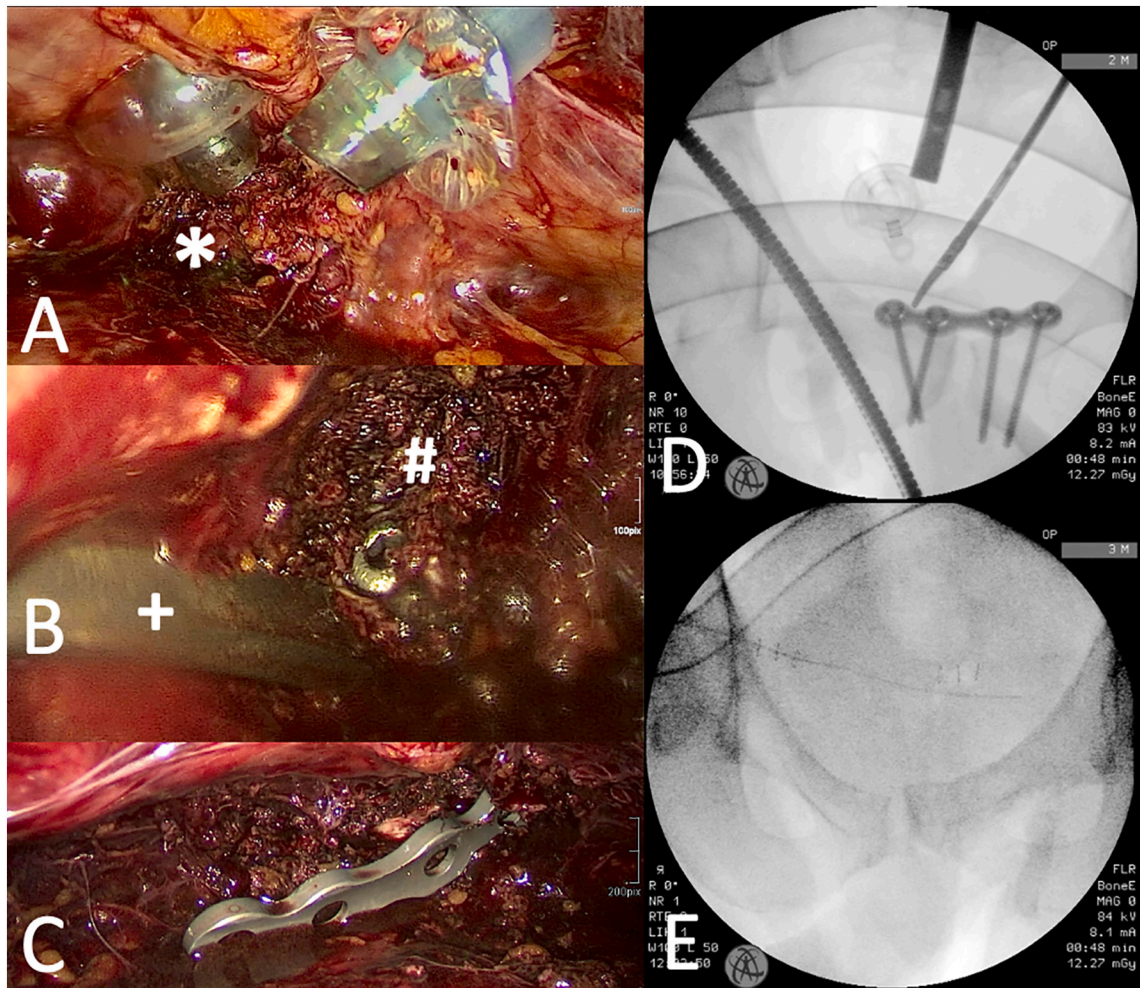


Fig. 3. (A) Intraoperative endoscopic images show scar tissue (*) covering the plate. The trocars are placed closely to the symphysis to reduce the need of shear forces on the abdominal wall and to place the screwdriver in the correct angulation easily. (B) The scar tissue is being removed using a conventional raspatorium (+) through one of the trocars. The plate (#) becomes visible. After removing the scar tissue as well as the plate's screws (C) the plate itself can be grabbed with forceps through one of the trocars and be removed this way. We performed X-ray controls to validate the correct positioning of the instruments (D) as well as the removal of the entire osteosynthetic material (E).

complaints about the anterior pelvic ring but mentioned the urgent wish to have the implants removed. Therefore, after detailed information about surgical risks and alternative procedures, he gave his informed consent for the endoscopically assisted removal of the symphyseal plate and simultaneous percutaneous removal of the iliosacral screw.

First, we established the subumbilical trocar according to the “EASY-approach”: Through a skin incision of about 2 cm and the anterior rectus sheath, the posterior rectus sheath was bluntly prepared. Then, the extraperitoneal space in front of the Retzii space was bluntly dissected using a dissection trocar. Both pubic branches could be visualized without injuries to the bladder. In the next step, a 12 mm working trocar was inserted 2 cm above the pubic symphysis. The scar tissue around the plate (Fig. 3A) was removed using a rongeur which was inserted via the working trocar (Fig. 3B). The plate itself was also surrounded by an osseous formation which was removed. After the removal of all surrounding tissue we were able to take out all the screws as well as the plate through the subumbilical incision (Fig. 3C). Finally, the sacroiliac screw was removed percutaneously. Due to the used standard laparoscopic and open surgery tools the surgery time increased significantly. The overall operation time was 1:40 h. Blood loss was <50 ml. The postoperative course was inconspicuous.

Discussion

To the best of our knowledge, we describe the first endoscopically assisted removal of a symphyseal plate. Complication rates between 17,5% for the modified Pfannenstiel approach [8] and 19% for the modified Stoppa approach [9] have been described respectively. In contrast, minimally invasive surgical procedures can significantly reduce approach-related morbidity rates and are

well established in many surgical disciplines [6].

There are established minimally-invasive procedures for the stabilization of the anterior pelvic ring, for example the “INFIX”-system [10] and the percutaneous intramedullary screw osteosynthesis [11]. They offer fairly easy ways to stabilize the pelvic ring or address moderately displaced fractures but both procedures lack the intraabdominal visualization and therefore are likely to have a higher risk of additional injuries. This is one of the major advantages of the endoscopic technique. With little soft tissue trauma to the abdominal wall, the approach enables surgeons to visualize the pelvic ring while also allowing to reduce fractures and insert implants in a controlled setting [7]. Besides these advantages, possible complications, especially during secondary interventions like implant removals, should be considered carefully.

They include increased risks for urinary bladder and vascular injuries. Moreover, the prolonged operation time, both due to the missing surgical routine in this kind of procedure for most of the orthopedic trauma surgeons and the lack of specific laparoscopic instruments, should also be taken into account. However, we are confident that the development of specific laparoscopic instruments would decrease surgery time significantly.

The indication of implant removals has always been a controversial issue. In 2012, Stuby et al. demonstrated that complications like bladder injuries and broken screws arise in up to 20% during removal of the osteosynthesis material from the anterior and posterior pelvic ring [12]. The development of alternative surgical techniques has always been a focus in an effort to reduce these complication rates. The “EASY”-technique provides a reliable way to visualize the anterior pelvic ring and stabilize injuries of the anterior pelvic ring with minimal soft tissue trauma.

Contraindications are infections of the abdominal wall and, as for now, any kind of previous abdominal surgery like hernia repairs, caesarean section, prostate or bladder surgery.

Conclusion

The aim was to present a case in which an endoscopically assisted procedure was used for both, initial stabilization and removal of the internal osteosynthesis material of the anterior pelvic ring. So far, missing robust specific laparoendoscopic instruments for pelvic procedures remain the biggest challenge. Their development and approval in clinical trials are currently under investigation.

Declaration of competing interest

All authors have disclosed all financial support for this work and other potential conflict of interests related to the publication of this manuscript.

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