

Original Research Article

Functional outcome after open reduction and internal fixation for traumatic diastasis of the pubic symphysis a one year follow-up study

B. L. S. Kumar Babu*, Biju Ravindran

Department of Orthopedics, Narayana Medical College, Nellore, Andhra Pradesh, India

Received: 16 September 2016

Accepted: 10 October 2016

***Correspondence:**

Dr. B. L. S. Kumar Babu,

E-mail: madhavulu@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Pubic diastasis often results in anteroposterior compression (APC) injuries based on Young and Burgess classification. It is caused due to high-energy trauma and of much clinical importance is given when coexists with urogenital and neurological complications with hemodynamic instability. Open reduction and internal fixation with plating facilitates early mobilisation with better results and is the preferable mode of stabilisation. We evaluated the clinical and functional outcome of such patients in a one-year follow-up period.

Methods: In our study, we included 20 patients with APC II injuries who underwent an open reduction by single or dual plating technique by the Pfannenstiel approach, were followed for one year.

Results: Among 20 patients, 14 patients (70%) were operated with single superior plating, six patients (30%) were performed with dual plating, i.e., both superior and anterior plating. Among 20 patients, two patients (10%) were operated for primary arthrodesis with double plating. Only one among 20 (5%) had implant failure due to early weight bearing and were re-operated with primary arthrodesis with plating. Results were analysed based on a scoring system which includes five criteria such as anterior pelvic pain, dyspareunia and sexual dysfunction, ability to sit, gait abnormalities and walking distance. Among 20 patients ten patients (50%) had excellent results, six patients (30%) had good results, two patients (10%) had fair results, two patients (10%) had poor results.

Conclusions: Open reduction and internal fixation of traumatic pubic diastasis in type II APC injuries with single or dual plating had given better results and early functional recovery.

Keywords: Open reduction and internal fixation, Traumatic pubic diastasis, Type II APC, Functional outcome

INTRODUCTION

Pelvic injuries are associated with high-energy trauma and hence they are haemodynamically unstable. Severity and stability of the injury will depend on upon the mechanism of injury and integrity of osseo ligamentous complexes of the pelvic ring. The pubic symphysis is an amphiarthrodial joint with fibrocartilaginous disc stabilised by the superior and inferior arcuate ligaments. Pubic Diastasis indicates a disruption of the pelvic ring and an unstable pelvis. According to Young and Burgess classification APC I are stable and APC II, APC III are unstable fractures as they result in high energy trauma

associated with urorectal and neurological complications and hence surgery is indicated.¹ Early non-invasive stabilisation using a pelvic binder, external fixators and C-clamps are used to manage for life-threatening bleeding. It has been reported that pubic diastasis is approximately 24% of pelvic injuries.² Management of APC II fractures, i.e., the symphysis gap more than 2.5 cm and posterior displacement less than 1 mm is always open reduction and internal fixation.³⁻⁸ Open reduction and internal fixation of pubic diastasis using plate facilitates absolute reduction and is now an excellent method of stabilisation with the belief that the reduction gap less than 1 cm is a significant, predicting the long-

term outcome.⁹ To this purpose, we evaluated the clinical and functional outcome of such patients in a tertiary care hospital for the period of one year.

METHODS

This study included a total number of 20 patients who sustained high-energy trauma, motor vehicle accidents and fall from the height pelvic injuries belong to anteroposterior compression type-2 according to Young and Burgess classification, having diastasis more than 2.5 cm with or without posterior displacement. Patients were excluded if they had the trauma of APC type-III or gross pre-existing osteoporosis. All included patients were undergone a thorough clinical evaluation for cutaneous lesions such as Morel Lavalles lesion, per rectal examination for urorectal injuries, and neurological examination to assess the severity. X-Ray analysis includes anteroposterior, inlet-outlet and Judet views to rule any associated acetabulum injuries, followed by CT scan. All the patients were treated initially to attain hemodynamic stability. After adequate stabilization of the general condition, patients were taken up for surgery. All patients with type II APC injuries were openly reduced and fixed by standard Pfannenstiel incision by the single surgeon as shown in Figure 1. The choice of dual versus single plating was based on the amount of displacement of the pubic symphysis assessed by preoperative x-rays, intraoperative stability and reduced bone quality.



Figure 1: Standard Pfannenstiel incision using anterior/superior single and dual plate fixation for traumatic diastasis of the pubic symphysis and implant failure.

Surgical technique: Pfannenstiel approach

Skin incision followed by an incision over linea alba to enter into space of retzius after which a blunt retractor is placed to retract bladder followed by reduction of symphysis using a clamp. Then expose the superior and anterior aspect of the symphysis pubis and an appropriately contoured 3.5 mm reconstructed plate is

placed anteriorly or superiorly and fixed with screws in proper angle checked under C-ARM. No patient was allowed to bear the weight initially. Physiotherapy was started on the 3rd postoperative day with reflexive hip knee and ankle exercises. Patients were advised to come for follow-up regularly every four weeks, then at every third month up to one year. On every visit, patients were evaluated both clinically and radiologically, and the functional outcome was assessed based on criteria such as anterior pelvic pain, dyspareunia and sexual dysfunction, gait abnormality, ability to sit, walking distance. The functional outcome of patients was assessed using Majeed scoring system because it includes most of the specific questions that determined the active status of the patients, in the last visit around one year after injury.¹⁰

Statistical analysis

Data was entered into Excel spread sheet. Descriptive data was presented as actual numbers and percentages.

RESULTS

Twenty patients who had traumatic pubic diastasis were studied out of which 18 are male, and 2 are female whose age is ranged between 24 to 48 years. 2/20 patients had positive Morel Lavalles lesion and urological complications. 18/20 were operated initially, and two were initially stabilized by external fixator for three weeks and later planned for open reduction and internal fixation. Only 1/20 underwent primary arthrodesis with iliac graft along with dual plating. 1/20 had implant failure due to early weight bearing and re-operated with dual plate. No patient underwent posterior fixation, as the sacroiliac disruption is less than 1 mm. Functional outcome at one-year follow-up revealed that 10/20 patients had excellent results, 6/20 patients with good results, 2/20 patients with fair results and remaining 2/20 patients with bad scores.

DISCUSSION

Pubic diastasis is often a result of anteroposterior compression (APC) injury based on Young and Burgess classification system. These injuries were classified into three types, APC-I slight widening of symphysis or anterior sacroiliac joint or both. APC II-widening of symphysis 2.5 cms disruption of sacrotuberous and sacrospinous ligament but intact posterior sacroiliac ligaments; APC III-complete disruption of symphysis with lateral displacement and disrupted anteroposterior sacroiliac ligaments with sacrospinous and sacrotuberous ligaments. In our study, we evaluated the functional outcome of traumatic pubic diastasis with open reduction and internal fixation to assess the influence of variable factors in long-term results. The presence of posterior sacroiliac disruption, bone quality, and accuracy of reduction, postoperative protocol and associated urorectal, neurological complication has a significant negative impact on the outcome.

Table 1: Functional outcome after single or dual plate fixation for traumatic diastasis of the pubic symphysis.

Domain	N (%)	Domain	N (%)
Anterior pelvic pain		Dyspareunia and sexual dysfunction	
Intense, continuous at rest	2 (10%)	Painful	3 (15%)
Intense with activity	1 (5%)	Painful if prolonged	4 (20%)
Tolerable, but limits activity	2 (10%)	uncomfortable	5 (25%)
With moderate activity, abolished by rest	3 (15%)	Free	8 (40%)
Mild,intermittent, normal activity	5 (25%)		
Slight, occasional or no pain	7 (35%)		
Ability of position		Gait abnormality	
Ability to sit	2 (10%)	Abnormal with aids	3 (15%)
Painful	5 (25%)	Abnormal without aids	7 (35%)
Painful if prolonged	3 (15%)	Normal gait.	10 (50%)
Uncomfortable	1 (5%)		
Free	0		
Walking distance		Total Score	
Limited distance	4 (20%)	Excellent	10 (50%)
Prolonged distance	9 (45%)	Good	6 (30%)
Average walking distance.	7 (35%)	Fair	2 (10%)
		Bad	2 (10%)

None of our patients had significant posterior ring disruption and hence none were stabilised posteriorly. A meticulous attention during the surgical dissection regarding the inadvertent invasion of the viscous, accuracy of symphysis reduction, repair of rectus was performed to avoid complications such as bladder injuries and post-operative wound herniation. Only two patients in our study had marked cutaneous lesion and genitourinary injuries that were managed initially by external fixator for three weeks later followed by open reduction. One patient in our study had implant failure due to early weight bearing and associated ramus fracture which was managed with implant removal, re-implantation with arthrodesis and proper soft tissue repair. None of our patients had postoperative wound complication and iatrogenic bladder injuries.

In our study, we believed that open reduction and internal fixation of traumatic pubis diastasis by single and dual plating give a solid biomechanical stability and early functional recovery. On the contrary, we believe that dual plating was advised in posterior ring disruption and marked diastasis as it gives biplanar stability. We recommended primary arthrodesis with plating in gross unstable and marked disruption of soft tissue attachments along the pelvic ring. We also recommend that not only the plating but also proper repair of soft tissue and intactness of rectus abdominals will add stability.

The only limitation of our study is the small sample size lack of strict radiographic evaluation, but we share our experience in the management of these high energy trauma injuries for the better outcome. Additionally, local

social and cultural status of our patients might have prevented us from having full details about their sexual life, in particular, the category of Majeed score.

CONCLUSION

Open reduction and internal fixation of traumatic pubic diastasis in type II APC injuries with single or dual plating had given better results and early functional recovery. We also believe that careful soft tissue dissection, preservation of soft tissue attachments, accuracy reduction, i.e., gap less than 1 cm, is recommended for satisfactory long-term results.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

- Burgess AR, Eastridge BJ, Young JW, Ellison TS, Ellison Jr PS, Poka A, et al. Pelvic ring disruptions: effective classification system and treatment protocols. *J Trauma.* 1990;30(7):848-56.
- Young J, Resnik CS. Fracture of the pelvis: current concepts of classification. *AJR.* 1990;155(6):1169-75.
- Tile M. Fractures of the pelvis. In: Schatzker J, Tile M, editors. *The Rationale of Operative Fracture Care.* Berlin: Springer-Verlag; 1996.
- Mac Avoy MC, Mc Clellan RT, Goodman SB, Chien CR, Allen WA, van der Meulen MC. Stability of open-book pelvic fractures using a new

- biomechanical model of single-limb stance. *J Orthop Trauma.* 1997;11(8):590-3.
5. Lange RH, Hansen ST. Pelvic ring disruptions with symphysis pubis diastasis. Indications, technique, and limitations of anterior internal fixation. *Clin Orthop Relat Res.* 1985;201:130-7.
 6. Dujardin FH, Roussignol X, Hossenbaccus M, Thomine JM. Experimental study of the sacroiliac joint micromotion in pelvic disruption. *J Orthop Trauma.* 2002;16(2):99-103.
 7. Simonian PT, Harrington RM, Mayo KA, Tencer AF, Routt LM. Biomechanical simulation of the anteroposterior compression injury of the pelvis. An understanding of instability and fixation. *Clin Orthop Relat Res.* 1994;309:245-56.
 8. Bagchi K, Uhl RL. Fixation of pubic symphyseal disruptions: one or two plates? *Orthopedics.* 2009;32(6):427.
 9. Aggarwal S, Bali K, Krishnan V, Kumar V, Meena D, Sen RK. Management outcomes in pubic diastasis: our experience with 19 patients. *J Orthop Surg Res.* 2011;6(1):1-9.
 10. Majeed SA. Grading the outcome of pelvic fractures. *J Bone Joint Surg Br.* 1989;71(2):304-6.

Cite this article as: Kumar Babu BLS, Ravindran B. Functional outcome after open reduction and internal fixation for traumatic diastasis of the pubic symphysis a one year follow-up study. *Int J Res Orthop* 2016;2:256-9.