

Functional and radiological outcome with double plating of pubic diastasis

S P Handralmath^{1*}, H V Kalambe², A S Mahajan³, Prashanth D'sa⁴

¹Associate Professor and Unit Chief, ²JR, ^{3,4}Assistant Professor, Department of Orthopaedics, Dr. V M Medical College and Hospital Solapur, INDIA.

Email: drsunilhandralmath@gmail.com

Abstract

Introduction: Pelvic fractures occur due to high-energy trauma like motor accidents and fall from height. Pelvis fractures occur in a bimodal pattern, with peak incidences in persons aged 20-40 years and later in persons aged older than 65 years. **Material and Method:** Study duration of present study is of one and half year for 15 patients. The patients follow inclusion criteria. **Results:** All patients with APC II injuries were operated for pubic diastasis with double plating. No implant failure or screw breakage was noted during the course of study. We investigate Type of Injury for Functional and radiological outcome. **Discussion:** we preferred Open reduction and internal fixation with double plating. We operated all the patients with APC II and APC III injuries. Double plating of pubic diastasis with posterior sacroiliac percutaneous screws fixation for vertical instability was our modality of treatment. **Conclusion:** Satisfactory results can be obtained by immediate closed reduction of the dislocated elbow followed by open reduction and K wire fixation of fractured lateral humeral condyle.

Keywords: Pubic diastasis, stable fixation, antero-posterior compression, vertical instability.

*Address for Correspondence:

Dr. S P Handralmath, Associate Professor and Unit Chief, Department of Orthopaedics, Dr. V M Medical College and Hospital Solapur, INDIA.

Email: drsunilhandralmath@gmail.com

Received Date: 02/07/2015 Revised Date: 10/07/2015 Accepted Date: 13/07/2015

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 17 July 2015

INTRODUCTION

A band of fibrocartilage anteriorly in the pelvic ring forms the pubic symphysis which along with posterior sacroiliac joints allow rotation and expansion of pelvis during physical activity.¹ Pelvic fractures occur due to high-energy trauma like motor accidents and fall from height and show significant mortality ranging from 5.6% to 15%.² APC (Anterior-Posterior Compression) according to Young and Burgess classification system is a result of an anteriorly directed force which causes pubic symphysis diastasis.³ Pelvis fractures occur in a bimodal pattern, with peak incidences in persons aged 20-40 years and later in persons aged older than 65 years.⁴ The

incidence of instability related to pelvic fractures ranges between 13-17% of all cases.⁵ Accurate reduction of pubic diastasis and early mobilization demand open reduction and internal fixation (ORIF). We preferred ORIF with dual (anterior and superior) plating.

MATERIAL AND METHODS

15 patients who presented to our hospital during the period of October 2010 to April 2012 were included in the study. It was a retrospective study for which ethical committee approval and informed consent of all patients were taken. The study included 11 males and 4 females. Several authors have recommended surgical stabilization when pubis diastasis is more than 2.5 cm, but letournel recommended symphysis stabilization even if disruption measures more than 1.5 cm.[6,7,8] All patients with pubic diastasis >2.5cm with or without sacro-iliac disruption were included in the study. Patients with open fractures and associated acetabular fractures, lower limb fractures and ankle injuries were excluded from the study. Patients were made hemodynamically stable before taking for surgery.

Table 1

Males	11
Females	4
Total	15

Tile classification and Young and Burgess classification systems were used to aid in the management of the patients.^{9,10} Among 15 patients 10 had APC II injuries and 5 patients had APC III injuries. Patients were operated in supine position with legs internally rotated (helps in reduction). Pfannenstiel incision was used and reduction was achieved with pointed reduction clamps which were applied anteriorly.¹¹ The plate was applied first superiorly followed by anterior plating.

Table 2

Type of injury	No of Males	No of Females	Total
APC II	7	3	10
APC III	4	1	5

Patients were given post-operative antibiotics for 48 hours and closely monitored for fever or any other signs of infection. Active hip and knee exercises were started on third post operative day. Full weight bearing was denied till the completion of 3 months. However partial weight bearing with the help of walker or crutches was started 1 week after the surgery. Patients were followed up at 3rd, 6th and 1year post operatively.¹² The functional assessment was done with Majeed score.¹³ Radiological assessments with radiographs (AP, Inlet and outlet views) were done on each follow up.

Table 3

Functional Outcome	Total score
Excellent	78 to 80
Good	70 to 77
Fair	60 to 69
Poor	<60

Table 4

Radiological outcome	Residual displacement
Excellent	0-5mm
Good	6-10mm
Fair	11-15mm
Poor	>15mm

RESULTS

Among 15 patients which were included in our study 10 patients had APC type II injuries and 5 patients had APC type III injuries. All patients with APC II injuries were operated for pubic diastasis with double plating (superior and anterior). And APC III injuries were managed by double plating and percutaneous sacroiliac screws fixation. In 10 patients with APC II injuries, functional score was excellent in 6 patients (60%) and good in 4 patients (40%). Radiological scores in these patients were excellent in 4 patients (40%), good in 4 patients (40%), fair in 1 patient (10%) and poor in 1 patient (10%). In 5 patients with APC III injuries, functional score was good in 4 patients (80%) and fair in one patient (20%). Radiological scores were excellent in 2 patients (40%), good in 2 patients (40%) and poor in one patient (20%). One patient with APC III injuries had developed post operative wound infection on day 3 which was managed with appropriate antibiotics. No implant failure or screw breakage was noted during the course of study.

Table 5

Type of Injury	Functional Outcome			
	Excellent	Good	Fair	Poor
APC II	6 Patients (60%)	4 Pts.(40%)	–	–
APC III	–	4 Pts. (80%)	1 Pt.(20%)	–

Table 6

Type of Injury	Radiological Outcome			
	Excellent	Good	Fair	Poor
APC II	4(40%)	4(40%)	1(10%)	1(10%)
APC III	2(40%)	2(40%)	–	1(20%)



Figure 1: Sitting crossed leg without any difficulty

DISCUSSION

The best fixation modality for pubic diastasis has always been the subject of debate. There are many ways in which fixation can be achieved like single anterior plating, double plating (anterior and superior), endobutton, external fixation and C-clamp etc. In our study we preferred Open reduction and internal fixation with double plating. Pelvic injuries are many times the result of high energy road traffic accidents. In these situations overall polytrauma assessment of patient is of paramount importance. Pelvic injuries are associated with significant blood loss and hence hemodynamic stability should be achieved at the earliest. Diagnostic imaging is also important but should not be undertaken unless patient is hemodynamically stable. Along with plain radiography, computer tomography of pelvis should be done to determine conservative or operative line of management. Diagnostic imaging also helps in accurate classification of the injuries. We operated all the patients with APC II and APC III injuries. Double plating of pubic diastasis with posterior sacroiliac percutaneous screws fixation for vertical instability was our modality of treatment. Biomechanical studies revealed that the physiological forces across the pubic symphysis are subsequently transmitted through the plate during rehabilitation, potentially contributing to the failure of fixation.¹⁴ Single plating provides less rigid fixation and chances of failure are high than double plating. A review of 12 articles which was published in 2004 found a total of 16 (5.7%) implant failures of 277 cases.¹⁵ Lange *et al*^[16] found that double plate fixation provides most stable fixation if soft tissues are handled meticulously to minimize the blood loss. Kapandji¹⁷ has proposed that a small amount of nutation (nodding) movements occurs at the sacro-iliac joints with physiological weight bearing in APC II. These movements tend to get transmitted anteriorly to the pubic symphysis. Therefore pubic diastasis fixation should be made as stable as possible which can be achieved with double plating. With double plating of pubic diastasis the fixation becomes very rigid and does not allow the micro-motion that physiologically occur at the pubic symphysis. Hence we kept very low threshold for implant removal. Females in the child bearing age should undergo implant removal once the union has occurred. In our study, One female (age--36yrs) with APC II injury had undergone implant removal at 14 months. As our sample size was small, statistical tests could not be applied. But we believe that double plating provides greater stability and decreased incidences of implant failures. As far as our study is concerned we did not encounter a single implant failure. In conclusion we would like propose that double plating in APC II injuries is best modality of treatment.

Posterior sacroiliac joints fixation in addition to double plating in APC III injuries confirms good functional and radiological outcomes as our study shows.

CONCLUSION

Although posteromedial dislocation of the elbow associated with fractured lateral humeral condyle in children is a rare injury, treatment is not difficult. Satisfactory results can be obtained by immediate closed reduction of the dislocated elbow followed by open reduction and K wire fixation of fractured lateral humeral condyle.

REFERENCES

1. (J Bone Joint Surg [Br] 2011; 93-B: 78-84.)
2. (Pelvic Fractures (excluding Acetabular fractures). Musculoskeletal Medicine for Medical Students. In: OrthopaedicsOne - The Orthopaedic Knowledge Network)
3. (Acta Orthop. Belg., 2013, 79, 54-59)
4. Korovessis P, Baikousis A, Stamatakis M, Katonis P. Medium and long term results of open reduction and internal fixation for unstable pelvic ring fractures. Orthopedics 2000; 23:1165-71.
5. Mucha P Jr, Farnell MB. Analysis of pelvic fracture management. J Trauma 1984; 24:379-86.
6. Tile M. Pelvic ring fractures: Should they be fixed? J Bone Joint Surg Br 1988;70:1-12
7. Burgess AR, Eastridge BJ, Young JW, Ellison TS, Ellison PS Jr, Poka A, *et al*. Pelvic ring disruptions: Effective classification system and treatment protocols. J Trauma 1990; 30:848-56.
8. Letournel E. Pelvic fractures. Injury 1978; 10:145-8.
9. Burgess AR, Eastridge BJ, Young JW, Ellison TS, Ellison PS Jr, Poka A, Bathon GH, Brumback RJ. Pelvic ring disruptions: effective classification system and treatment protocols. J Trauma. 1990; 30(7):848-56. doi: 10.1097/00005373-199007000-00015. [PubMed] [Cross Ref]
10. Fractures of the pelvis - Tile classification. Orthopaedics One Articles. In: OrthopaedicsOne - The Orthopaedic Knowledge Network.
11. Campbell's Operative Orthopedics 12th edition vol. 3 P.N0.2816
12. J Orthop Surg Res. 2011; 6: 21.
13. Majeed SA. Grading the outcome of pelvic fractures. J Bone Joint Surg Br. 1989; 71(2):304-6. [PubMed]
14. Sagi HC, Papp S. Comparative radiographic and clinical outcome of two-hole and multi-hole symphyseal plating. J Orthop Trauma 2008; 22: 373-378.
15. Raman R, Roberts CS, Pape HC, Giannoudis PV. Implant retention and removal after internal fixation of the symphysis pubis. Injury 2005; 36:827-31.
16. Lange RH, Hansen ST., Jr Pelvic ring disruptions with symphysis pubis diastasis. Indications, technique, and limitations of anterior internal fixation. Clin Orthop Relat Res. 1985. pp. 130-7. [PubMed]
17. Kapandji I. The Physiology of the Joints. Churchill Livingstone. 1974. p. 3

Source of Support: None Declared
Conflict of Interest: None Declared