

FRACTURE ZONES OF QUADRILATERAL PLATE OF ACETABELUM USING THREE DIMENSIONAL COMPUTED TOMOGRAPHY IMAGES IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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INTRODUCTION:

Quadrilateral plate fracture is included in the acetabulum fracture and is challenging for orthopaedic surgeons. Despite the well-described Letournel-Judet classification, quadrilateral plate fracture remains a heterogenous acetabular fracture. Therefore, this study aimed to observe the prevalence of fracture line involving the quadrilateral plate to better understand the acetabular fracture morphology.

MATERIALS & METHODS:

A total of 68 CT images of the hip or pelvis at 1 mm slice thickness performed from 2011 until 2020 were evaluated. The DICOM format data were obtained from PACS, and 3D images of the hemipelvis were constructed using a 3D Slicer software to expose the whole aspect of the quadrilateral plate. Parameters measured include fracture configuration of the quadrilateral plate of the acetabulum, which consisted of the zone of involvement in quadrilateral plate fracture and fracture line direction related to the zone of involvement. Then, the collected data were analyzed using SPSS version 26. Patients' characteristic were summarized using frequency and percentages for categorical data, while the Kruskal-Wallis test was performed and expressed in the form of mean and standard deviation for numerical data.

RESULTS:

Based on the 68 fractures that met the inclusion criteria of this study, a majority of them occurred in zone C or C-type (n=37; 54%), whereas the remaining fractures involved zone A, A-type (n=29; 44%) and zone B, B-type (n=2, 2%). Additionally, the most common fracture pattern was the simple fracture line (n=52, 76%) with A-type fracture at 54% (n= 28), B-type fracture at 2% (n=1) and C-type fracture at 44% (n=23). In contrast, the comminuted fracture configuration

contributed only 24% (n=16) with A-type fracture at 6% (n= 1), B-type fracture at 6% (n=1) and C-type fracture at 88% (n=14). Furthermore, half of the fracture line directions were perpendicular to the arcuate line (n=34, 50%), followed by mixed fracture (n=25, 37%) and parallel to arcuate line (n=25, 37%).

Figure 1: Type A1 fracture perpendicular to the arcuate line

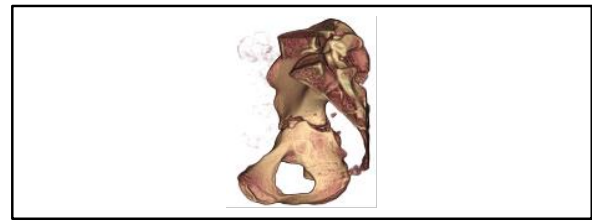
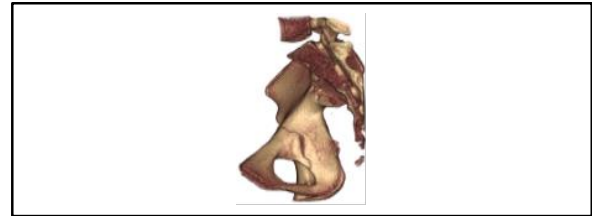


Figure 2: Type B1 fracture perpendicular to the arcuate line



DISCUSSIONS:

A quadrilateral plate of acetabulum fracture was classified irrespective of the Letournel classification. Based on the findings, the most affected area in the acetabular fracture is the upper section of the quadrilateral plate, supported by the high occurrence of fracture line in Zone A or Zone C. After inspecting the anatomical features of the quadrilateral plate and characteristic distribution of the fracture line; the surgeon can safely install the internal fixation device and minimize mistake in tackling the areas susceptible to fracture.

CONCLUSION:

Observing fracture morphology of quadrilateral plate in combination with Letournel-Judet classification can assist orthopaedic surgeons in further understanding acetabular fractures comprehensively and intuitively.

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