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Epidemiology and results of non-operative treatment of Pelvic ring fractures and Disjunctions at Kara University Hospital

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Abstract

Introduction: Pelvic ring fractures and disjunctions are rare but can be life-threatening in the short term, as well as functionally. This study aimed to determine the frequency of pelvic trauma and to describe its management.

Patients and Method: This study was retrospective and descriptive over two years, from January 2021 to December 2022. It involved patients aged 15 years and over with fractures or disruptions of the pelvic ring and had been treated in the traumatology-orthopaedics department of the Kara University Hospital. The parameters studied were epidemiological, lesional, therapeutic and evolutionary.

Results: During the study period, 41 cases of patients with pelvic fractures or disjunctions were selected from a total of 856 admissions for 1112 fractures. This represented 4.78% of admissions and 3.38% of all fractures. The average age was 34 years. Males predominated (71%, n=29); females accounted for 29%, n=12. Motorbike taxi drivers (29%, n=12) and farmers (24%, n=10) constituted the most represented social strata. According to the AO/OTA classification, stable pelvic fractures, classified as type A, were the most frequent (51%, n=21). These were followed by type B lesions (34%, n=14); then type C (15%, n=6). The violence of the trauma (mean ISS score =20) led to cases of polytrauma (22%, n=9). Haemodynamic instability was found in 37% (n=15). There were 4 cases (10%) of rupture of the posterior urethra and 3 patients (7%) had a perineal wound. There was an associated distant lesion in 15 other cases (37%). Treatment for osteoarticular injuries to the pelvis was functional (61%; n=25) and orthopaedic (34%; n=14). There were two deaths (5%). Thirty-nine (39) patients were reviewed. The mean overall Majeed score was 93 (34-100).

Conclusion: Pelvic ring fractures and disjunctions are uncommon but serious. Because of the limited technical resources and the financial difficulties of patients, only functional and orthopaedic means are used for treatment, with satisfactory results.

Keywords: Pelvic ring, Fractures, hemorrhagic complications, urinary complications, pelvic belt

Introduction

Pelvic ring fractures and disjunctions are rare. They account for between 2% and 8% of all fractures [1]. In Togo, they account for 3.41% of all fractures [2]. They are found in 20% of cases of polytrauma [3, 4]. These lesions often occur in young people. They are caused by high-energy trauma such as road traffic accidents and can be life-threatening [5]. Fractures of the pelvic ring are serious injuries because they can lead to immediate death from haemorrhagic shock. In the medium and long term, they are often associated with urological, neurological and even orthopaedic complications, thus compromising patients' functional prognosis [6, 7]. The diagnosis of pelvic ring fractures and disjunctions has been refined over the years, notably through the Tile classification [8]. According to this classification, type A lesions are considered stable, while type B and C lesions are said to be unstable. Treatment may be functional, orthopaedic or surgical, the aim being to re-establish pelvic ring stability to avoid acute haemorrhagic complications and functional sequelae [7, 9]. In developing countries, the management of these lesions is hampered by the precarious financial situation of patients and the inadequacy of technical facilities.

This study aimed to describe the epidemiological and lesional aspects of pelvic ring fractures and disjunctions and to assess the results of non-operative treatment of these lesions.

Patients and Methods

This study was retrospective and descriptive over two years, from 1 January 2021 to 31 December 2022. It involved patients aged 15 years and over with fractures or disruptions of the pelvic ring and had been treated in the traumatology-orthopaedics department of the Kara University Hospital. Acetabular fractures and discharges against medical advice were excluded. The parameters studied were sociodemographic, lesion, treatment and evolution.

On admission, the severity of the trauma was assessed using the Injury Severity Score (ISS) [10]. A standard frontal X-ray of the pelvis was used to make the diagnosis. The AO/OTA classification [11] was used to list bone injuries. For fractures involving the posterior arch, a CT scan of the pelvis was often necessary.

In situations of haemodynamic instability, the pelvis was restrained using a lincloth, sheet or pelvic belt (Figure 1), at the same time as resuscitation measures were initiated. Final treatment was either functional or orthopaedic. Functional treatment consisted of bed rest and the administration of analgesics and anti-inflammatories against pain. The patient was allowed to get up once the pain had subsided, with the crutches. This functional treatment was regarding parcel fractures which did not rupture the pelvic ring, classified as type A. Orthopedic treatment was provided for unstable lesions. Open-book pubic disjunctions were treated with a pelvic belt fitted with a strap that allowed progressive closure of the pelvic ring (Figure 1). Vertically unstable type C fractures were treated by trans condylar femoral longitudinal traction, combined with a pelvic belt. In all cases, thromboembolic complications were prevented by daily injections of 4000 IU of low molecular weight heparin until the patient got up.



Fig 1: Pelvic belt, applied to the greater trochanters, used in emergencies and for the orthopaedic treatment of open-book pubic dislocation

Functional results were assessed using the Majeed score [12] after a mean follow-up of 15.36 months. The data were processed and analysed using SPSS software (IBM SPSS Statistics 26).

Results

Epidemiological aspects

During the study period, 856 patients were admitted. They presented with 1112 fractures. Of these admissions, 41 patients met our indication criteria. This represented 4.78% of admissions and 3.68% of all fractures. The average age of the patients was 34, with extremes of 16 and 75. There were 29 men (71%) and 12 women (29%). According to occupation,

farmers and motorbike taxi drivers were in the majority (Table I). Public road accidents caused trauma in 93% of cases (n=38), followed by a fall from a height in 5% (n=2) and a domestic accident in 2% (n=1).

Table 1: Distribution of patients according to occupation

	Frequency	Percentage
Motorcycle/vehicle drivers	12	29
Farmers	10	24
Private individuals/employees	8	20
Workers	7	17
Students/pupils	4	10
Total	41	100

Anatomopathological aspects

Parcel fractures type A accounted for 51% (n=21). Pelvic injuries that are rotationally unstable and vertically stable classified as type B were found in 34% (n=14). Those that are rotationally and vertically unstable classified as type C accounted for 15% (n=6). Table II lists the different osteoarticular lesions of the pelvis. In 39% (n=16) there was an immediate complication such as haemodynamic shock due

to retroperitoneal haematoma (22%; n=9); and rupture of the posterior urethra (10%; n=4). The urethral rupture occurred only in men. The rupture was total in one case and partial in 3 cases. There was a cutaneous opening in the perineum in 3 other patients (7%). Associated distant lesions are listed in Table III. They were dominated by limb fractures. There were nine cases (22%) of polytrauma. The mean ISS was 20 points [1-75].

Table 2: Osteoarticular lesions of the pelvis according to the AO/OTA classification

Type	Number (%)	Group	Number (%)	Sub-group	Number (%)
A	21(51%)	A1	3(8%)	A1.1	0
				A1.2	2(5%)
				A1.3	0
		A2	18(44%)	A2.1	3(8%)
				A2.2	12(29%)
				A2.3	4(9%)
		A3	0	A3.1	0
				A3.2	0
				A3.3	0
B	14(34)	B1	9(22%)	B1.1	2(5%)
				B1.2	7(17%)
				B1.3	0
		B2	5(12%)	B2.1	0
				B2.2	2(5%)
				B2.3	3(8%)
		B3	0	B3.1	0
				B3.2	0
				B3.3	0
C	6(15%)	C1	4(10%)	C1.1	1(2%)
				C1.2	3(8%)
				C1.3	0
		C2	1(2%)	C2.1	0
				C2.2	1(2%)
				C2.3	0
		C3	1(2%)	C3.1	0
				C3.2	1(2%)
				C3.3	0
Total	41 (100%)				

Table 3: Associated lesions

	Number	Percentage
Limb fractures	7	47
Cranioencephalic trauma	2	13
Trauma to the spine	2	13
Abdominal trauma	3	20
Dislocation	1	7
Total	15	100

Therapeutic and evolutionary aspects

Treatment of osteoarticular injuries to the pelvis was functional (61%; n=25) and orthopaedic (34%; n=14) (Figure 2). Open fractures (3 cases) were trimmed urgently. Total rupture of the posterior urethra was treated by delayed urethroplasty. Partial urethral ruptures were treated with primary realignment. Abdominal trauma was treated non-operatively.

Orthopaedic complications were dominated by malunion and asymmetry of the pelvis, resulting in unequal length of the lower limbs in 4 cases. Urological lesions had a favourable outcome with no sequelae.

There were 2 deaths (5%) during hospitalisation due to non-stabilised haemodynamic shock, associated with sepsis in one case where there was a perineal wound.

Thirty-nine (39) patients were reviewed. The mean overall Majeed score was 93 (34-100).



Fig 2: Asymmetry of the pelvis following orthopaedic treatment of a type B2.3 pelvic rupture

Patients with type A fractures scored 100 (51%; n=21). Poor scores were regarding type C fractures.

Discussions

This study aimed to determine the frequency of pelvic ring fractures and disjunctions and to evaluate the results of non-operative treatment of these lesions.

Pelvic ring fractures are uncommon. They account for 3.68% of fractures in our study, which is in line with the literature, which reports a frequency of between 2% and 8% of all fractures [1]. Dakouré in Burkina Faso reported an average annual frequency of 19 cases, and an average annual prevalence of 2.84% [13]. These injuries occur most often as a result of accidents on public roads, due to the increase in the number of cars and two-wheeled vehicles. Road traffic accidents were the predominant cause in 58.6% of cases in the Dakouré series in Burkina Faso in 2012 [13], in 80% of cases in the Ngongang series in Cameroon in 2014 [14], and in 81% of cases in the Muluen series in Cameroon in 2021 [15]. Pelvic ring injuries preferentially affect young adults, as shown by the average age of our patients, which was 34.3 years. This average age is in the most active part of the population and is therefore highly exposed to violent accidents. Dakouré reported in his series that the majority of patients were between 20 and 40 years of age [13], while Ngongan, in his series, found that the majority of patients were in the 20-30 age group, followed by the 30-40 age group [14]. Male predominance is the rule in most series [13, 14, 15, 16], the latter being known to be hyperactive.

In terms of lesions, according to the AO/OTA classification, parcel and stable lesions were predominated in our series (51%). This predominance of stable lesions has been found by several authors [1, 13, 17, 18]. Lawson in Benin, on the other hand, reported a higher frequency of type B lesions [19]. Trauma to the pelvic ring is caused by a high-energy accident. As a result, rupture of the pelvic ring is accompanied by several associated lesions whose morbidity and mortality depend on it [18]. Some authors have shown a correlation between the occurrence of associated injuries and the trauma severity score (ISS) [20]. Haemorrhagic complications are often at the forefront [21, 22]. There were 37% haemorrhagic complications in our series, and these led to death in two cases. Nana *et al.* reported 33.82% of hypovolaemic shock in their series regarding unstable pelvic lesions classified as type B and C [23]. Apart from haemorrhagic complications, trauma to the urinary tract was the second most common immediate complication in our series (10%). Dakouré reported 12.1% of cases of urological lesions, and these were caused by displaced fractures of the anterior arch of the pelvic ring [13]. Men are the most exposed to these complications because of the particular anatomy of the male urethra, which is the segment of the urinary tract most frequently affected [24, 25]. Trauma to the urethra in women is rare because the female urethra is shorter and more mobile [24, 25, 26]. Other associated injuries were dominated by limb trauma, as reported by several authors [13, 15, 19].

Treatment of osteoarticular lesions of the pelvis is divided into emergency treatment (Circumferential sheets, pelvic binders, c-clamps); and definitive treatment, which may be functional, orthopaedic (Transosseous traction, hammock, bed-chair immobilisation) or surgical (External fixator, screw fixation, screw plate) [1, 4, 18, 27]. In emergency cases of pelvic instability associated with haemodynamic instability, loincloths, sheets, or pelvic belts were used in our series to temporarily stabilise the pelvic ring. According to the literature, physiological haemostasis can be obtained by rapid mechanical stabilisation of the pelvis using folded bed sheets, pelvic binders and c-clamps [4, 28, 29]. For definitive treatment, it is accepted that unstable lesions of type C and types B2 and 3 should be treated surgically, as posterior stability is essential for a better functional prognosis [18, 23]. Due to financial difficulties and limited technical resources, our treatment was

mainly functional and orthopaedic. Malunion, pelvic asymmetry and posterior instability occurred in type B and C lesions.

Conclusion

Fractures and disjunctions of the pelvic ring are uncommon but serious, as they can be life-threatening and functionally crippling in the short term. In our context, they are usually found in young people, most of whom had stable type A lesions. Functional treatment, as well as orthopaedic treatment using a pelvic belt and bone traction, has achieved satisfactory results.

Conflict of Interest

Not available

Financial Support

Not available

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