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Knowledge and Practice of Pelvic and Acetabular Fractures Management Among Orthopaedic and Trauma Surgeons in Nigeria

[1]Ogunlusi Johnson D., [1]Yusuf Moruf B., [2]Hailu Samuel., [3]Olasinde Anthony A., [1]Popoola Sunday O., [4]Esan Oluwadare., [1]Oluwadiya Kehinde S.

[1]Department of Surgery, Ekiti State University, Ado-Ekiti, Nigeria, [2]Department of Orthopaedic Surgery, Addis Ababa University, Addis Ababa, Ethiopia, [3]CURE Niger Hôpital des enfants, Niamey, Niger, [4]Department of Orthopaedic Surgery, Obafemi Awolowo University, Ile-Ife, Nigeria

Corresponding Author: Dr. Yusuf M. B; moruf.yusuf@eksu.edu.ng

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ABSTRACT

Background: Pelvic-acetabular fractures are markers of high energy trauma and are associated with significant morbidity and mortality; and management could be challenging. The inability to surgically manage these fractures appropriately in our centre and few publications on pelvic-acetabular fractures in Nigeria stimulated this study; to find out how pelvic and acetabular fractures are managed and availability of investigating tools in Nigeria.

Methods: A questionnaire was uploaded for 7 weeks on the National orthopaedics and trauma surgeons' forum. Questions on pelvic fractures management, knowledge and classification of pelvic fractures, preferred methods of pelvic fractures management- surgical or non-surgical, availability of advanced investigating tools and desire to acquire more skills /training were asked.

Results: Eighty-five (33.2%) of the 256 members participated in the study. Preferred classifications were Tile and Young-Burgess 46 (56.8%), 29 (35.8 %), AO-ASIF 3 (3.5%) and Judet - Letournel 3 (3.5%). Thirty-six (43.9%) had Computerize Tomography scan (CT) while 19 (23.2%) had Magnetic Resonance Imaging (MRI) available in their place of practice. Twenty-eight (34.6%) would manage operatively, 8 (9.9%) would either operate or refer, while 23 (28.48%) would either manage non-operative or refer and outright non-operative in 7 (8.6%) of pelvic-acetabular fractures that require Open Reduction Internal Fixation (ORIF). Forty-six (56.8%) would refer patients; because of non-availability of skilled surgeon in 30(65.2%) and non-availability of operating tools in 32(69.6 %). Seventy-four (90.2%) would like to acquire skills in pelvic surgery.

Conclusion: The study highlights a varied approach among respondents to classifying and managing pelvic fractures. There is a notable tendency towards non-operative management or referral to other facilities due to the scarcity of specialized surgical skills and adequate tools. Importantly, there exists a significant interest among orthopaedic surgeons to enhance their expertise in pelvic surgery, suggesting a critical need for improved training and resources.

Key Words: Knowledge, Practice, Pelvic-acetabular, Fractures, Nigeria

1. INTRODUCTION

Pelvic fractures are markers of high energy trauma and are associated with significant morbidity and mortality.[1] It is usually caused by significant high impact injury in young adults and children; in which severe fracture patterns are associated with visceral injury in up to 60% of patients.[2] In the elderly, these lesions are associated with low-energy trauma due to poor bone quality.[3] It is found in many polytrauma patients and could be associated with injury to pelvic structures, abdominal injuries and severe haemorrhage which could be life threatening.[4,5] The haemodynamically unstable patients with severe pelvic fracture pose a significant challenge to trauma surgeons and have high mortality.[4,6]

Pelvic and acetabular fractures represent challenges, in terms of diagnosis, treatment and outcomes.[2,5] With evolution of modern diagnostic tools and intervention, their management have come a long way.[1] The literature describe an extensive therapeutic arsenal for the various types of pelvic injuries and some of the options proposed come up against the high cost of implants, the lack of equipment and technical difficulties for the surgeon.[4,7,8] Good overall functional outcome depends

on dedicated trauma management team, experienced pelvic-acetabular surgeon and availability of sophisticated diagnostic tools.[1] With modern day diagnostic and therapeutic modalities, the functional outcome that could be achieved are promising.[1] These promising outcomes also depend significantly on the knowledge of the physician/surgeons who initiate emergency care of these patients; to expertly diagnose, stabilize and treat these patients.[9]

There have been few publications on management of pelvic and acetabular fractures in Nigeria. Olasinde et al reported on non-surgical management of pelvic fractures with satisfactory outcome and Onche et al reported on traumatic posterior dislocation of the hip and associated injuries[10,11]. Challenges such as the non-availability of computed tomography (CT), Magnetic Resonance Imaging (MRI), and a lack of surgical expertise at our primary center—where four of the six authors are based—prompted this multicenter study. These limitations often necessitate referring some patients to a facility approximately 320 km away

The aims of the study were to determine how pelvic and acetabular fractures are being managed in Nigeria, determine the availability of appropriate pelvic-acetabular fractures investigating tools and surgical skills among the orthopaedic and trauma surgeons.

Recommendations could be made on how to improve the care of patients with pelvic and acetabular fractures-if necessary.

2. METHODS

The respondents of this cross-sectional study were Nigerian orthopaedic surgeons who are members of the official WhatsApp group of the Nigerian Orthopaedic Association (NOA). The NOA is the umbrella body of all orthopaedic surgeons in Nigeria. In Nigeria, orthopaedic surgeons work across both secondary and tertiary healthcare facilities. Secondary facilities include private and general hospitals, while tertiary facilities comprise Teaching Hospitals and Federal Medical Centres (FMCs). These tertiary hospitals function similarly to Level I trauma centers in the USA.

We designed and uploaded a questionnaire on Google Forms, and we posted a link to the form on the WhatsApp forum through which surgeons were invited to fill the questionnaire. On submission, filled forms were automatically uploaded to an email created for the research and only the lead author had access to the email and collated the data for analysis. This was to minimize bias and errors. The study lasted seven weeks between 26/03/2019-11/05/2019. Reminder about the survey was sent weekly to the forum during the period of the study.

The questionnaire contained 16 items on the knowledge of and management of pelvic and acetabular injuries. The questionnaire was reviewed, validated by the authors, and jointly agreed to be used for the study.

Information collected included the following: years of practice as orthopaedics/trauma surgeon, knowledge of classification of pelvic fracture, preferred methods of pelvic fractures management, availability of investigating tools like Computed Tomography, Magnetic Resonance Imaging and Doppler USS at the practicing centres. Other questions were types of surgeries done, their frequencies and willingness of the surgeons to acquire further skills to operate pelvic-acetabular fractures. The identity of the participants was not revealed, and the information collected was kept confidential.

2.1 Data Analysis

The responses were collated and analysed with IBM SPSS Statistics, Version 23. Frequency distributions were used to describe the variables. Comparison of variables were done using Chi-square test and level of statistical significant was put at $p \leq .05$.

3. RESULTS

There were 256 members, spread across the country on the Orthopaedic and Trauma Surgeon forum. Eighty-five (33.2%) members responded. There were eighty-four males and one female. Forty-two (51.9/%) had 10 years or below practicing experience, 39 (48.1%) have practiced for more than 10 years. Sixty-seven (81.7%) of the respondents work at teaching hospitals or FMCs while the remaining 15 (18. 3%) in general or private hospitals. Twenty-eight (38.9%) of the respondents were in the Northern part of the country, 44 (61.1%) in the Southern part and more than half, 28, of the Southern respondents were in South-west. Sociodemographic features of the respondents are showed in Table 1.

Table 1: Sociodemographic features of respondents

Sociodemographic Features	Frequency (%)	Number of Respondents
Number of Years Post Fellowship		**81**
<11	42 (51.9)	
11 – 20	32 (39.5)	
21 – 30	6 (7.4)	
>30	1 (1.2)	
Geopolitical Zone		**72**
Northcentral	17 (23.6)	
Northeast	6 (8.3)	
Northwest	5 (6.9)	
Southeast	7 (9.7)	
Southsouth	9 (12.5)	
Southwest	28 (38.9)	
Setting of Practice		**82**
Teaching Hospital	50(61.0)	
Federal Medical centre	17(20.7)	
General Hospital	7(8.5)	
Private hospital	8(9.8)	

Preferred classification by the respondents (81) were Tiles 46 (56.8%), Young-burgess 29 (35.8%), AO-ASIF 3 (3.7%) and Judet-Letornel 3 (3.7%) each. Thirty-six (43.9%) of the respondents (82) had Computerize Tomography scan (CT) while 19 (23.2%) had Magnetic Resonance Imaging (MRI) available in their place of practice (Figure 1).

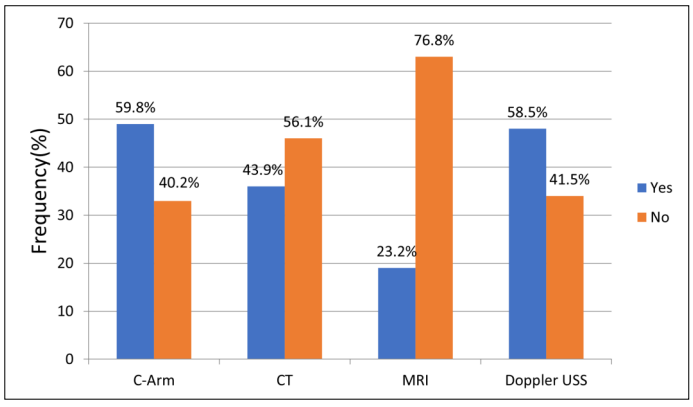


Figure. 1: Advanced imaging methods available in respondents' place of practice (n=82)

Table 2: Advanced imaging methods available at the tertiary health among the respondents (n=67)

Setting of practice (n)	Advanced Imaging Method							
	C-arm		μCT scan		αMRI		Doppler βUSS	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Teaching Hospital (50)	34(68.0)	16(32.0)	26(52.0)	24(48.0)	16(32.0)	34(68.0)	35(70.0)	15 (30.0)
*FMC (17)	8 (47.1)	9 (52.9)	8 (47.1)	9 (52.9)	0 (0.0)	17 (100)	9 (52.9)	8(47.1)
Chi-square test	P = 0.12		P = 0.73		P < 0.05		P = 0.20	

*Federal Medical Centres, μComputerized Tomography, αMagnetic Resonance Imaging, βUltra Sound Scan

Table 2 shows the advanced imaging methods available at the tertiary health centres among the respondents. There is no statistically significant difference in the availability of advanced imaging methods between the two tertiary centres, except for MRI (P < .05).

Methods commonly used by respondents (79) in managing hemodynamically unstable pelvic fractures patients were iliac crest external fixation in 32 (40.5%), skeletal traction in 28 (32.4%), pelvic suspension sling in 15 (19.0%) and supra-acetabular external fixation in 10 (12.7%) of the respondents. The methods used in managing pelvic fractures that require open reduction and internal fixation (ORIF) are showed in Table 3.

Reasons for the referral of patients requiring ORIF, as indicated by the respondents (46),some of whom provided multiple responses, included the non-availability of operating tools in 32 cases (69.6%) and the lack of skilled pelvic surgeons in 30 cases (62.5%), as detailed in Figure 2.

Out of 82 respondents, 49 (59.8%) had previously performed pelvic-acetabular surgeries (Figure 3), and 25 (30.5%) had operated on pelvic-acetabular fractures within the six months prior to the study. There was no significant difference in the decision to operate on pelvic-acetabular fractures requiring ORIF between teaching hospitals (30 out of 50) and Federal Medical Centers (FMCs) (6 out of 17), with a p-value of 0.78. Similarly, no significant difference was found between tertiary health centers (36 out of 67) and general/private hospitals (5 out of 15), with a p-value of 0.15.

Seventy-four (90.2%) of the respondents would like to have further training in pelvic and acetabular fractures management.

Table 3: Methods of managing pelvic fracture that requires ORIF

*Methods	Yes (%)	No (%)	Total
Operative	41 (50.6)	40 (49.4)	81
Non operative	26 (32.1)	55 (67.9)	81
Referral	46 (56.8)	35 (43.2)	81

*Some respondents provided multiple responses; four did not make any selection

4. DISCUSSION

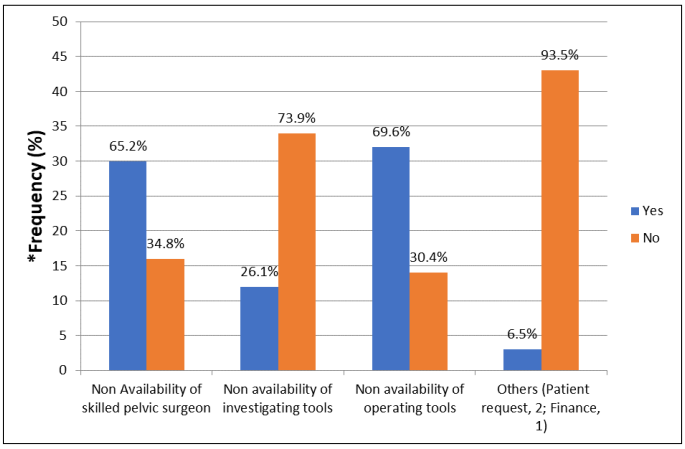
From our study majority of the respondents indicated they have knowledge of pelvic fracture classifications in the course of management of patients with pelvic injuries and were interested in acquiring skills in pelvic surgery

Appropriate and timely management of pelvic and acetabular injuries is very important especially those that are associated with life threatening injuries and those that will require surgical intervention. Such surgical intervention requires availability of human resources who are well-trained and experienced as well as necessary facilities to ensure safe practice[11]. There were 85 respondents in the study and all except one were males. Worldwide there are fewer female orthopaedic and trauma surgeons than their male colleagues and Nigeria is not an exemption as shown by the numbers of respondents[12,13].

Sixty-seven (81.7%) of the respondents work at Federal Medical centres or teaching hospitals (tertiary referral centres which serve as Level 1 trauma centres in Nigeria). Forty-four (61%) of the respondents were practicing in the southern part of Nigeria which means that orthopaedic and trauma coverage of the north is poorer than in the south. Meanwhile, sixty percentages of the orthopaedic /trauma surgeons in the north are concentrated in the north central zone, showing that the remaining zones may be poorly served.

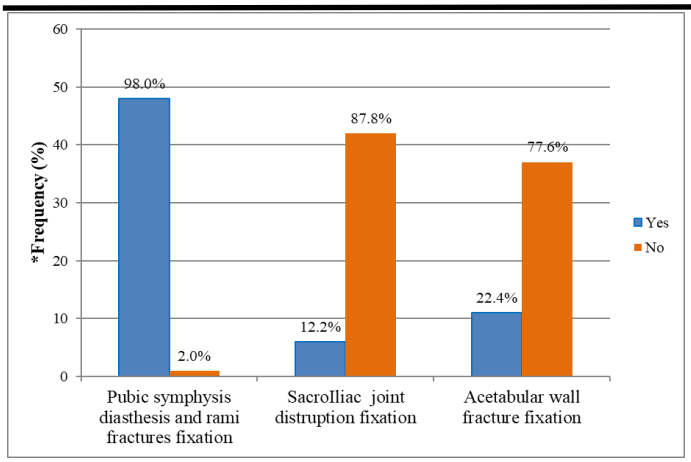
Most orthopaedic surgeons in this study preferred Tile and Young-Brugess classifications to AO or Judet & Letornel classifications. In a similar study done by Balbachevsky et al, Tile 41.4%, and AO 36.9% classifications were the preferred methods of classification of pelvic and acetabular fractures.[3] Different classification systems exist, some are based on anatomic patterns, mechanism of injury and some are focused on the resulting instability requiring operative fixation[14].

In heamodynamically unstable pelvic fractures, mortality ranges between 10% and 60% and their management could be challenging[15]. In this study, the commonly used procedures in managing this group of patients were iliac crest external fixator, (40.5%) and skeletal traction (35.4%) while in Balbachevsky et al study, the majorly preferred procedures were; iliac crest external fixator 79.5%, supra-acetabular external fixator 12.8% and pelvic suspension sling in 12.8%[3]. Although, early and aggressive use of blood products in these patients appears to improve survival, over -enthusiastic resuscitative measures may not be the safest strategy[15]. Other procedures and methods that are used in this group of patients are; Pneumatics Anti Shock Garment (PASG), extraperi-



*Some respondents provided multiple responses

Figure. 2: Reasons for referral in 46 responders



*Some respondents provided multiple responses

Figure 3: Types of pelvi-acetabular ORIF done by the respondents (n=49)

toneal packing / preperitoneal pelvic packing (PPP) / retroperitoneal packing, angioembolization and ligating the external or internal iliac vessels[4,6,15-17]. DuBose et al has used bilateral ligation of internal iliac arteries (BLIA) as a damage control tool for a select group of patients with massive / rapidly expanding retroperitoneal haemorrhage after pelvic fracture and stated that no survivors after (BLIA) were noted to have apparent adverse ischemic sequelae[18]. Pelvic trauma surgeon must be familiar with most of these procedures and be ready to co-manage the patient with other specialties surgeons, applying multidisciplinary approach to save the life of the traumatized patients[14].

Half of 82 responders would manage fractures that required ORIF operatively. PubMed search on non-operative pelvic fracture management revealed only one paper published decades ago[19]. Obviously, non-operative pelvic fracture management has not been a popular option but might have a place only in fragility fractures of the pelvis; in patients with a life expectancy of less than 2 years[20].Forty-six (54.1%) of the responders would refer mainly because of non-availability of skilled surgeon 30(65.2%) and non-availability of operating tools in 12(26.1 %). The referral of these patients would be ideal and logical but, in a situation where the patient is transferred over hundreds of kilometers, this might worsen the clinical state of the patient. Federal medical centres and teaching hospitals (Level 1 trauma centres) should be well equipped, staffed with well trained and skilled pelvic and acetabular surgeons to minimize the referral of these severely injured patients over long distances.

The types and number of pelvic and acetabular surgeries done by the respondents showed that the surgeries were not regularly done and indicated that fixation of the pubic symphysis diasthesis were commoner than the more complex sacroiliac and acetabular surgeries. The study showed that there was no statistically significant difference in the choice of operative approach to fix pelvic-acetabula fractures that requires ORIF within the tertiary centres and between tertiary centres and general /private hospitals. Many authors have noted that experience in pelvic trauma surgery is significant in both the choice of treatment and success in achieving optimum results[21-23]. The need to do many pelvic and acetabular surgeries per week would shorten the learning curve and make optimum care of pelvic fractures possible.

Though, there is no statistical significant differences in the availability of the advance imaging techniques in teaching hospitals and FMCs, except in MRI, which none of the 17 FMCs had. The availability of these imaging tools at the practicing centres were limited. These imaging tools are highly essential for diagnosis and management of pelvic injuries. Grieser mentioned that CT remains the "diagnostic workhorse" and MRI is of particular importance in fragile pelvic fracture[24]. CT angiography is a great diagnostic tool, showing contrast extravasation (CE) on computed tomography (CT) in hemodynamically unstable patient, to know the bleeding source[25]. The most common vessels for angioembolization are, in decreasing order, the internal iliac artery and its branches, the superior gluteal artery, the obturator artery, and the internal pudendal artery; and these could be picked up by CT Contract study and embolization would be an alternative to open surgery[26]. Many minimally invasive procedures like retrograde suprapubic intramedullary screw fixation and sacroiliac fracture-luxation repair could be done under CT or Fluoroscopy guidance[27-29]. The advantages of these procedures - small incision with minimal soft tissue disruption, operation time is shorter, shorter learning curve and less morbidity are well-documented in literature[28,29]. The study revealed that sixty-seven (81.7%) of the respondents work at tertiary hospital that serves as our Level I trauma centres, therefore provision of these radiological imaging tools at these centres are highly essential to improve the care of the patients and for the optimal surgical outcome.

Seventy-four (90.2%) of the respondents would like to acquire skill / training in pelvic surgery, this would improve the pelvic and acetabular fracture care of patients. Ghosh et al stated that overall functional outcome of pelvic fracture care was good due to availability of sophisticated diagnostic tools, dedicated trauma management team and experienced pelvic-acetabular surgeon[1]. This should be the target in our environment to adequately manage patients with pelvic and acetabular fractures.

5. CONCLUSION

Our study revealed that pelvic fracture that requires ORIF would be managed non-operatively by 1/3rd of the respondents, more than half would refer because of non-availability of skilled pelvic surgeon and non-availably of operating tools. It also showed that our teaching hospitals and Federal Medical centres were not adequately equipped with Computed Tomography, C-arm and Magnetic Resonance Imaging.

RECOMMENDATION

To provide qualitative surgical care for our patients with pelvic and acetabular fractures, the governments and relevant organizations/ institutions should invest in training of skilled pelvic-acetabular surgeons and provide the essential investigating tools like CT, C-arm and MRI.

AUTHORS` CONTRIBUTIONS

JDO was involved in all stages of the work; MBY and KSO were involved in design, analysis and interpretation of data; and drafting and revising the manuscript for important intellectual content; OE, SH and SOP were involved in the acquisition, analysis and interpretation of data for the work; and drafting and revising the manuscript for important intellectual content. All authors read and approved the version to be published.

CONFLICT OF INTEREST

The authors declared no conflicts of interest.

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