ORIGINAL ARTICLE

COMPARING THE EFFECTS OF HAEMATOMA BLOCK AND CONSCIOUS SEDATION IN ADULTS WITH DISTAL RADIUS FRACTURES.

[1]Onuoha K.M, [1]Orimolade E.A, [2]Onuoha C.E.O, [1]Adegbehingbe O.O, [1]Ikem I.C

Department of Orthopaedics and Traumatology, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Osun state, Nigeria.
Department of Surgery, Babcock University Teaching Hospital, Illishan-Remo Ogun State

ABSTRACT

BACKGROUND: Distal radius fractures present frequently to the orthopaedic surgeon following high velocity injuries in the young or low velocity injuries in the elderly. Haematoma block or conscious sedation can be applied to provide anaesthesia during reduction. Comparing the effects of both anaesthetic methods is yet to be fully evaluated.

OBJECTIVE: To compare the pain level and quality of reduction using haematoma block and conscious sedation following reduction of distal radius fractures.

DESIGN: Prospective comparative cross-sectional study.

PATIENTS AND METHODS: Seventy patients with distal radius fractures were grouped for closed reduction; in one group conscious sedation was used and the other, haematoma block. All patients had pain measured with Visual Analogue Scale and quality of reduction by measuring palmar tilt on plain radiograph.

MAIN OUTCOME MEASURES: Severity of pain and palmar tilt on radiograph measured before and after reduction.

RESULTS: The modal age group was 60 years (40%) with a slightly higher female preponderance (57.1%). Majority, 54.3% had injuries following fall on outstretched hand. The mean Visual Analogue Score for pain following conscious sedation and haematoma block post reduction was 3.5 and 2.4 respectively. The mean palmar tilt of radius for conscious sedation and haematoma groups were 10.1 and 10.9 degrees respectively. There was no statistically significant difference in the efficacy of both anaesthetic methods.

CONCLUSION: The choice anaesthesia for reduction of distal radius fracture on should be based on surgeon's preference, patient's wish and history of drug reactions.

Key Words: Distal Radius Fractures, Haematoma Block, Conscious Sedation.

Abbreviations: DRF --- Distal radius fracture
HB --- Haematoma block
CS --- Conscious sedation
VAS --- Visual analogue scale

Correspondence to:
Dr K.M Onuoha
Department of Orthopaedics and Traumatology,
Obafemi Awolowo University Teaching Hospitals Complex,
Ile-Ife, Osun state, Nigeria.
E-mail: mckelng@yahoo.com
Telephone: +234 803 412 8159

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INTRODUCTION

Distal radius fractures are amongst the most common fractures seen, having high potential for functional impairment and frequent complications. Fractures of the distal end of the radius have been estimated to account for one-sixth of all fractures that are seen and treated in the emergency room.[1]The term, distal radius fracture (DRF), properly covers all fractures of the distal radial articular and metaphyseal areas.[2]

It is agreed that the ultimate goal of anaesthesia is to eliminate or reduce pain to the barest minimum to allow for adequate fracture reduction.

Different anaesthetic techniques can be used to achieve a successful reduction in patients with distal radius fractures. In our environment, conscious sedation and haematoma block are most frequently used.[3,4]The two methods are both effective however, the superiority of one over the other is yet to be determined in our environment, hence this study.

Majority of Nigerians who sustain closed distal radius fractures are offered non-surgical treatment with either conscious sedation or haematoma block. Majority of doctors use the former while a few use the latter method.

PATIENTS AND METHODS

Ethical clearance was obtained before the study which was carried out at no cost and minimal risk to patients. There were also no conflicts of interest to declare patients who fulfilled the inclusion criteria were recruited into the study which was carried out over a 12–month period. Those included were consenting adults 18 years and above who sustained closed distal radius fractures and presented within 72 hours of injury. Those excluded were patients with previous distal radius fracture on same upper limb, those with carpal injury, those with injury to other bones and systems such as chest, abdomen, head. Also excluded were patients with known allergies to local anaesthetics and sedatives, and patients with visual or auditory impairment. A sample size of 70 was determined and after initial resuscitation with the Advanced Trauma Life Support (ATLS) protocol, patients were then placed into two groups by picking pieces of paper which were pre-labelled namely; Conscious sedation (CS) and Hematoma Block (HB) with 35 patients per group. Intravenous access was obtained in the contralateral limb for drug administration and the patient's pain level accessed using the visual analogue scale (P1). For patients in the CS group, 30mg of pentazocine was administered followed by 10mg Diazepam, both given intravenously after dilution in a 1:1 ratio with water for injection. On sedation, the fracture was manipulated to achieve reduction using the pre-reduction radiograph as a guide. The pain level was noted again using the visual analogue scale (P2) by direct questioning of the patient done when fully awake about 20 minutes after the procedure. For patients in the HB group, intravenous access was obtained in the contralateral limb and P1 determined using the visual analogue scale. The wrist and distal forearm of the patient was then cleansed with Chlorhexidine and methylated spirit. Ten milliliters of 2% plain lidocaine (3-5mg/kg for adults) was diluted in a 1:1 ratio and introduced into the fracture site after aspiration to obtain hematoma, all carried out under aseptic conditions. After 5 minutes, the fracture was manipulated to achieve reduction using the x-ray as a guide. The P2 and vital signs were also monitored for both groups of patients and post reduction x-rays were

taken immediately after reduction and the palmar tilt of distal radius was determined with a goniometer.

RESULTS

It is noted that those above 60 years of age had the modal incidence of DRF (40%) followed closely by those aged 18-30 years (24.3%). The mean age was 50 +/- 18.2. This is illustrated in the bar chart (Figure 1) below.

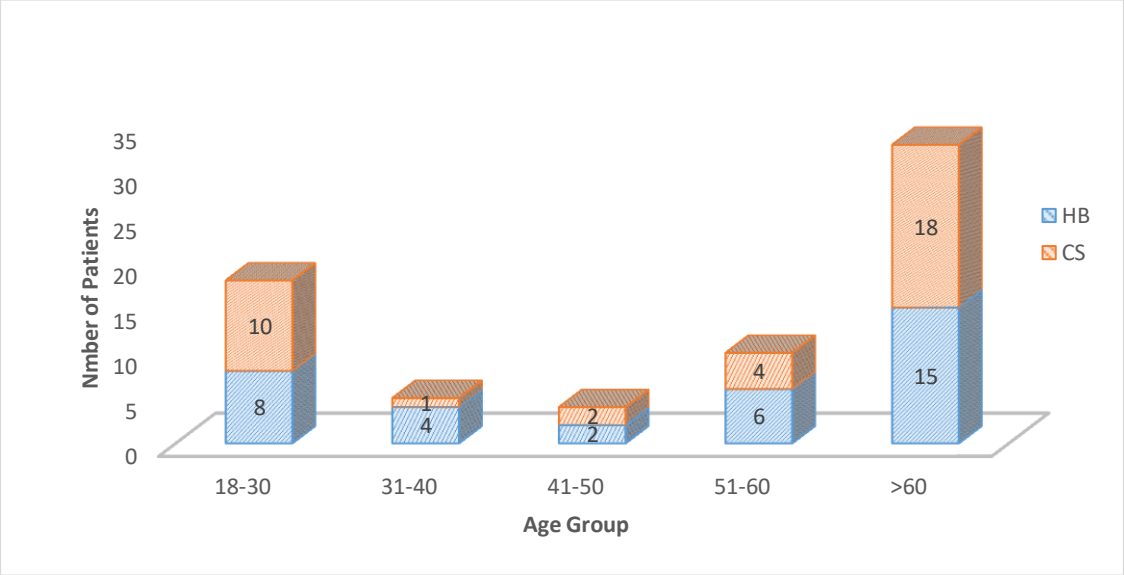

Figure 1: Age group of patients studied.

Concerning gender, females had a higher rate of DRF compared to males. It is noted that for the HB group, there were 25 females and 10 males while for the CS group, there were 27 females and 8 males. This makes a total of 52 females and 18 males giving a female to male ratio of 2.8: 1. This is represented in the composite bar chart below (Figure 2).

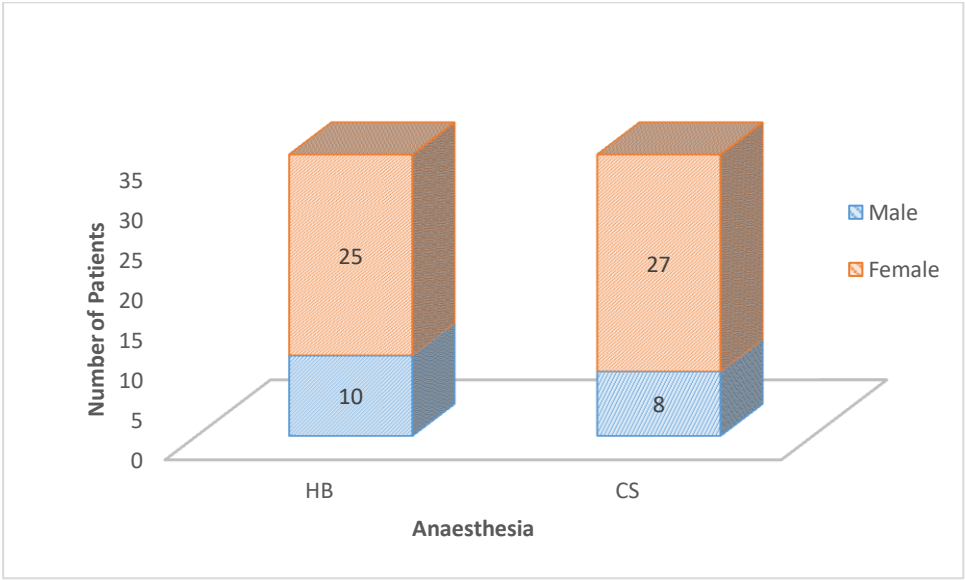

Figure 2: Gender distribution

Very few patients sustained injuries from assault, sport and fall from heights, with incidence of 2.9%, 5.7%and 7.1% respectively. This is illustrated in Figure 3.

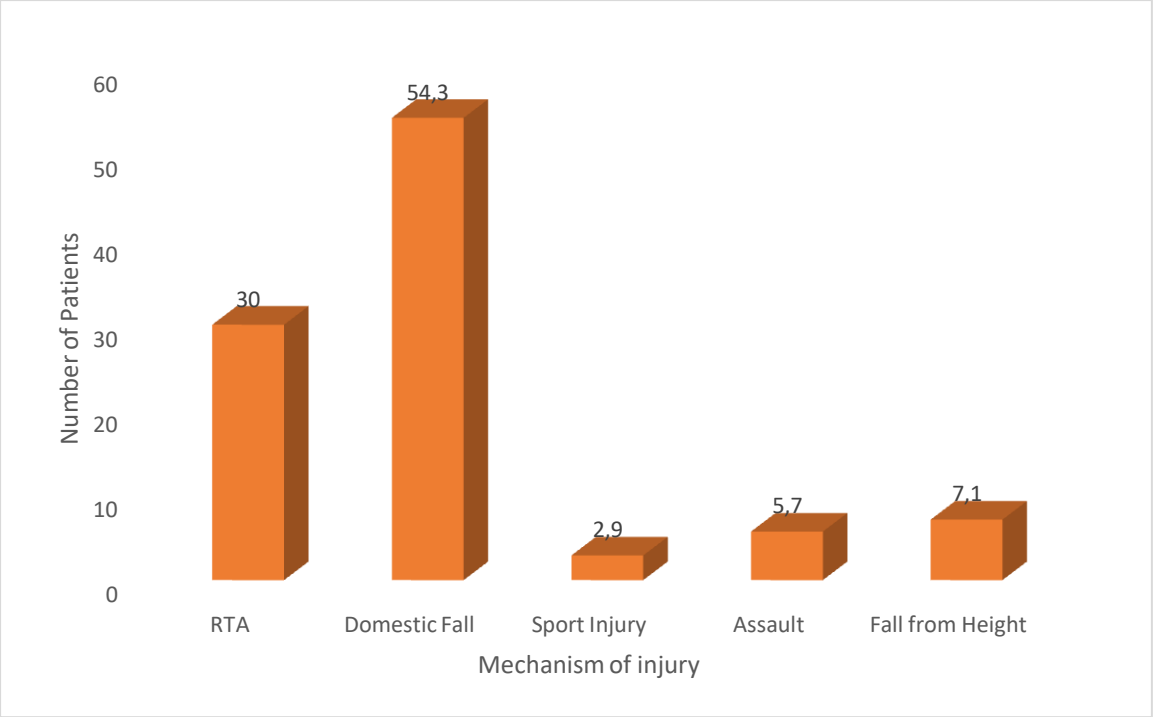

Table 1: Showing VAS for pre and post reduction

	Score	n (%)
P1 (PRE REDUCTION)	7	16(22.9)
	8	30(42.9)
	9	19(27.1)
	10	2(2.9)
	5	3(4.3)
	Total	**70(100.0)**
VAS P2(POST REDUCTION)	1	9(12.9)
	2	15(21.4)
	3	20(28.6)
	4	17(24.3)
	5	6(8.6)
	6	3(4.3)
	Total	**70(100.0)**

The table above shows the Visual Analogue Scale (VAS) for pain for both pre reduction and post reduction. It is noted that for the VAS P1, no patient scored less than 5, the modal score was 8 (42.9%), while only 2.9% had a score of 10 which is the maximum score. For the VAS P2, no patient scored above 6 which had the least frequency of 4.3%, majority 28.6% had a score of 3, while 12.9% had the minimum score of 1.

Table 2: Pre and Post reduction radiograph (Palmar tilt)

Palmar tilt (in degrees)	n(%)
Pre- reduction	
$13\text{-}15^0$	26(37.1)
$16\text{-}18^0$	35(50.0)
$>18^0$	9(12.9)
Total	70(100.0)
Post reduction	
15^0	8(11.4)
10^0	17(24.3)
11^0	20(28.6)
12^0	14(20.0)
13^0	11(15.7)

The above shows the frequency of the palmar tilt on post reduction radiograph. It is seen that majority 72.9 % have a palmar tilt between 10 and 12 degrees which is normal, followed by those with 13 degrees (15.7%) while 11.4% have the least palmar tilt of 15 degrees(11.4%)

Table 3:Post reduction visual analogue scale: Analysis of haematoma block and conscious sedation

VAS	ANAESTHESIA USED			X^2	P value	Remark
	Conscious sedation n(%)	Haematoma block n(%)	Total			
1	0(0)	9(13.4)	9(13.4)			
2	6(9)	9(13.4)	15(22.4)			
3	11(16.4)	9(13.4)	20(29.9)			
4	12(17.9)	5(7.5)	17(25.4)	18.585	0.100	Not Significant
5	6(7)	3(2.3)	9(9.0)			
Total	**35(50)**	**35(50)**	**70(100)**			

Table 3 shows the analysis of pain comparing the haematoma block and conscious sedation. It is noted that given a p value of 0.100 and degree of freedom of 4.7, the chi square value (x^2) of 18.585, shows there is no statistically significant difference in post reduction visual analogue scores between haematoma block and conscious sedation. (X^2=18.585, P>.05)

Table 4: Post reduction radiograph: Analysis comparing haematoma block and conscious sedation for

Post reduction radiograph(palmar tilt)	Conscious sedation n(%)	Haematoma block n(%)	Total	X^2	P value	Remark
15^0	6(9.8)	2(3.3)	8(13.1)			
10^0	6(9.8)	11(16.0)	17(25.8)			
11^0	11(10.8)	9(9.8)	20(20.6)	3.800	0.434	Not significant
12^0	6(9.8)	8(13.1)	14(22.9)			
13^0	6(9.8)	5(8.2)	11(18.0)			
Total	35(50)	35(50)	70(100.0)			

Table 4 shows the analysis of post reduction palmar tilt comparing haematoma block and conscious sedation. It is seen that given a p value of 0.434, the chi square value (x^2) is 3.8, thus there is no statistically significant difference in the palmar tilt between haematoma block and conscious sedation (X^2= 3.800, P> .05).

DISCUSSION

With the ageing population and increase in road traffic accidents in our environment, fractures of the distal radius remain a common presentation to the orthopaedic surgeon. In this study, it was noted that usuallypostmenopausal females were more affected than males which is similar to a study done by Ogunlade, Alonge and Salawu in 2002.[3]

This study showed that the modal age group was above 60 years followed closely by the young age group. For the elderly and 18-30 age group, more patients (18 and 10 years) had conscious sedation while in the 51-60 and 31-40 age group, more patients (4 and 1) had haematoma block. In this study, the elderly were mostly from low energy trauma usually from falls and the young were usually from high impact injuries, usually road traffic accidents. These findings were similar to both local and international studies done at Ibadan and by Dorset in UK [3,5]thus a bimodal distribution is noted.

Concerning mechanism of injury, falls on outstretched hand were seen to be the commonest cause followed closely by road traffic crashes. This is similar to results of a study done by Adewole et al in 2009. It is expected that with a more active elderly population, the incidence of these fractures will continue to rise. It is also observed in this study that majority of the patients did not have any associated injuries. This can be explained by the low velocity injury which accounted for most of the fractures. Falls on the outstretched hand is the commonest mechanism of injury in distal radius fractures. [3,6]

Lefontine et al identified palmar tilt of more than 20^0 as one of the factors responsible for instability[7]. In this study, the palmar tilt was used to check adequacy of reduction as this is the most accurate method compared with the other parameters as documented by Simon N in 2012.[8]The mean palmar tilt after

reduction was 10.14 degrees for conscious sedation and 10.89 degrees for haematoma block which are both within the normal range. With a p value of 0.404 and a chi square of 0.84, it can be concluded that there is no statistically significant difference in the post reduction radiographs following either haematoma block or conscious sedation.
Furthermore, considering the VAS scores, it is observed that the mean VAS p2 score for conscious sedation was 3.5 +/- .98 while that for haematoma block was 2.4 +/- 1.0. Given a p value of 0.895 and a chi square of 4.74, itcan therefore be concluded that there is no statistically significant difference in the pain following reduction either using conscious sedation or haematoma block. This was done using the Visual Analogue Scale which is the most commonly used tool for measuring severity of pain.[9] During reduction using both methods, the risks of complications and intra-articular fractures were taken into consideration.[10,11]

None of the patients had infection which is a known complication of haematoma block.[12]The researcher prevented this by making sure that asepsis was maintained before and during injection. None of the patients also had respiratory arrest from conscious sedation which is a known complication of pentazocine use.[12] This was achieved by diluting the drug with sterile water for injection in a 1 in 1 dilution and administering it slowly. Respiratory arrest was also avoided by making sure the lignocaine was not injected into a blood vessel. This was ensured by aspirating before injecting.

The drugs used to achieve conscious sedation in this study were pentazocine and diazepam. These sedated the patient and also caused muscle relaxation thus aiding reduction, however these drugs have side effects like respiratory depression.[13,14] Some patients may wish to be sedated during the procedure. Plain lignocaine was the drug used for haematoma block. It has anti-inflammatory properties and blocks sodium channel in the nerves that transmit pain while patient is awake, there is thus no muscle relaxation.[15] Side effect is allergies and heart block.[15] Use of haematoma block was found to be effective by Ogunlade et al in a study done in Ibadan, Nigeria.[3] However, this study did not compare the use of haematoma block and conscious sedation as was done in ours.

It can therefore be inferred, from the results of this study, that there is no statistically significant difference in the outcome following use of either conscious sedation or haematoma block for reduction of closed distal radius fractures. Thus, any of the anaesthetic methods may be used. However, there may be need to individualise the choice based on patient's wish, surgeon's preference and history, if any, of reactions to either pentazocine or lidocaine. Similar studies done in children revealed haematoma block to be more effective and safer.[4] Also studies done in 1999 by Singh et al revealed same findings.[16]

CONCLUSIONS

Distal radius fractures can be managed non-operatively using either haematoma block or conscious sedation as anaesthesia based on Surgeon's preference with Pain and palmar tilt (on radiograph) being objective ways of assessing the effect of the aforementioned anaesthetic methods.

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