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Analgesia Reverses Abnormal Lung Function Tests in Patients with Blunt Chest Injury

Eyo Effiong Ekpe[1*], Catherine S. Eyo[2], O. O. Bassey[3] and Anietimfom Etiuma[3]

[1]Cardiothoracic Surgery Unit, Department of Surgery, University of Uyo, Nigeria.
[2]Department of Anaesthesia, University of Uyo, Nigeria.
[3]Cardiothoracic Surgery Unit, Department of Surgery, University of Calabar, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Authors EEE, OOB and AE designed the study, author EEE performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author EEE managed the analyses of the study. Authors EEE and CSE managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To evaluate the effect of analgesia for chest pain control in multiple rib fractures in adult blunt chest trauma patients in terms of improvement in ventilatory function, reversal of abnormal lung function test parameters at different periods of analgesia.
Methodology: Prospective study of 64 adult patients with blunt chest injury.
Results: There were 64 adult patients with blunt chest trauma studied with male-female ratio 8.4:1.5; dominated by young adults and middle age (92.2%). Commercial motorcyclists and tricyclists, all males, accounted for 62.5% of the patients (p=0.0001) and motorcycle and tricycle accidents accounted for 78.1% of the causes (p=0.005).
Respiratory function was adversely affected by chest pain and got improved when the pain was controlled as shown by the following respective pre and post analgesic means of percent predicted lung function test parameters with statistical significance: FVC (80.3% vs. 93.3%), FEV1 (79.7% vs. 93.5%), FEV_1/FVC ratio (FEV_1%) (79.9% vs. 90.6%), FEF (84.8% vs. 92.2%), and FEF 25-75

**Corresponding author: E-mail: eyoekpe@uniuyo.edu.ng, docekpe@yahoo.com;*

(79.9% vs. 92.0%). Before analgesic, 44 (68.7%) of the patients rated their chest pain as severe, but by one hour after the first dose of analgesic only four (6.3%) patients still had severe chest pain ($p < 0.0001$) and at 24 hours the difference in chest pain improvement was also statistically significant ($p=0.02$).

Conclusion: Analgesic is capable of reversing the abnormal lung function test parameters associated with chest pain of blunt chest injury.

Keywords: Blunt chest injury; lung function; analgesia.

1. INTRODUCTION

Thoracic trauma leading to multiple fractured ribs (MFR) remains common [1,2]. The significant chest pain of multiple rib fractures can be difficult to manage and can lead to decreased pulmonary function, increased hospital stay, and increased health care expenditures [2]. Multiple rib fractures cause severe chest pain that can seriously compromise respiratory mechanics and exacerbate underlying lung injury and pre-existing respiratory disease, predisposing to respiratory failure [3]. Good analgesia instituted early may help to improve the patient's respiratory mechanics, and avoid intubation of the trachea for ventilator [1,3]. Analgesia could be provided using systemic opioids, transcutaneous electrical nerve stimulation or non steroidal anti-inflammatory drugs. Alternatively, regional analgesic techniques such as intercostal nerve block, epidural analgesia, intrathecal opioids, intra- pleural analgesia and thoracic paravertebral block have been used effectively [3]. Studies have shown that injection into one intercostal groove blocks not only the intercostal nerve of that groove, but at least the one above and below it because of sub-pleural tracking [4]. Immediate pain relief after intercostal nerve block and improvement in pulmonary mechanics have been demonstrated in several reports [4]. Surgical stabilization of rib fractures in form of open reduction and internal fixation is an alternative treatment for pain management of multiple rib fractures [5].

The present study was aimed at prospectively evaluating the effect of analgesia for chest pain control in multiple rib fractures in adult blunt chest trauma patients in our centre in terms of improvement in ventilatory function, reversal of abnormal lung function test parameters at different period of analgesia and chest pain score.

2. MATERIALS AND METHODS

Following urgent postero-lateral and oblique chest radiographs to confirm the clinical diagnosis of rib fracture(s) in the appropriate patients with blunt chest injury who met all the inclusion criteria and given written consent for the study, the radiographic films were interpreted to ascertain the number and order of rib fractures. Three baseline readings of lung function tests and pain score (using the 4-point verbal rating scale) were taken and recorded on proforma. Then analgesic which included intercostals nerve block and intravenous tramadol hydrochloride was administered at the dosage of 100 mg (1.5-2.0 mg/kg body weight) intravenously slowly via an in-dwelling venous cannula every 8 hours for 24 hours. All the patients were re-assessed at one hour and 24 hours after commencement of analgesic for repeat lung function tests and assessment of chest pain control and re-recorded on the profoma. Patients who had breakthrough pain and complained received additional administration of 30mg of pentazocine injection intravenously. All patients' data were collated and analysed using Stata version 10.

The ethical approval for this study was obtained from the Institutional Health Research Ethics Committee of University of Uyo Teaching Hospital, Nigeria and all included patients gave written informed consent.

3. RESULTS

There were 64 adult patients with multiple rib fractures caused by blunt chest trauma studied with male-female ratio 8.4:1.5. Young adults and middle age (mostly males) were very culpable accounting for up to 92.2%. However among the female victims with multiple rib fractures, the age distribution was even from young adult to elderly age group (Table 1). Table 1 also shows the occupations of the victims of traumatic multiple rib fractures in this study with commercial motorcyclists and tricyclists, all males, accounting for 62.5% of all patients, in addition to the five commercial drivers (7.8%) in the study being males. This was statistically significant as commercial transportation is regarded as male's job ($p<0.0001$). The other occupations in the

study were few and evenly distributed among both genders.

Table 2 shows the mechanism of the blunt chest injury. Motorcycle and tricycle accidents significantly accounted for the cause of multiple rib fractures in 50 (78.1%) of the patients. Others motor traffic accident in nine (14.1%), fall from height in two (3.1%), and fall into gutter, fall in bathtub, and hit by a falling tree branch in the remaining three (4.7%) of patients. Again multivariate analysis shows that motor cycle and tricycle accident as a cause of multiple rib fractures to be statistically significant when compared to other causes ($p<0.05$).

Table 3 depicts the stratification of the 64 patients with traumatic multiple rib fractures according to the severity of chest pain on the 4-point verbal rating scale across the study period. Before the institution of analgesic, 44 (68.7%) of the patients rated their chest pain as severe, and by one hour after the first dose of analgesic only four (6.3%) patients still had severe chest pain. This was statistically significant with p-value < 0.0001. And by 24 hours of pain therapy no patient reported severe chest pain. Also before commencement of analgesic no patient reported zero chest pain or mild chest pain, but at one hour post analgesic assessment four (6.3%) and 29 (45.3%) patients reported zero and mild chest pain respectively. And by 24 hours of analgesic up to 49 (76.6%) had only mild chest pain ($p=0.02$). Only two patients complained of severe breakthrough pain and 30 mg of pentazocine injection was administered.

Respiratory function was adversely affected by chest pain of traumatic rib fractures and got improved when the pain was controlled. According to Table 4, average forced vital capacity (FVC) of the 64 patients in the study was low (80.3% of predicted) before commencement of analgesia. However following administration of analgesic, the FVC of all patients improved with average of 93.3% of predicted at the first hour and 91.4% of predicted

Table 1. Socio demographic characteristics of blunt chest trauma patients (N=64)

Socio-demographic characteristics	Frequency (%)	
Age group(years)		
16-30	22(34.4)	P=0.381
30-50	21(32,8)	
50-60	16(25.0)	
Above 60	5(7.8)	
Occupation		
Commercial cyclists (including tricycle riders)	40(62.5)	
Commercial drivers	5(7.8)	P= 0.00001
Civil servants	8(12.5)	
Students	7(10.9)	
Others	4(6.3)	

Table 2. Types of injury of the adult patients with chest trauma and number of rib fractures

Variables	Frequency (%)	Statistical index
Mechanism of injury		
Motor cycle (including		P value<0.05
Tricycle)	50 (78.1)	
Motor traffic accident	9 (14.1)	
Fall from height	2 (3.1)	
Others	3 (4.7)	
No of ribs fractured		
Two	13 (20.3)	P value=0.979
Three	25 (39.1)	
Four	16 (25.0)	
Five	9 (14.1)	
Six	1 (1.6)	
Total	64(100)	

at 24 hours. Before analgesic no patient had FVC prediction > 100%, only five (7.8%) patients had FVC prediction of 91 – 100%, 30 (46.9 %) patients had 81-90% prediction, 20 (31.3%) had 71-80% prediction while nine (14.1%) had less than 80% predicted. But at one hour, the respective figures changed to 6.3% of patients having >100% FVC prediction, 68.8% of patients having 91 – 100% FVC prediction, 21.9% of patients had 81-90% of FVC prediction, while only 3.1% had less than 80% predicted FVC value. The increment at the first hour was statistically significant with p-value = 0.001.

The forced expiratory volume at first second (FEV_1) aspect of respiratory function test also exhibited the same pattern as FVC aspect. FEV_1 was moderate (mean = 79.7% predicted) before commencement of analgesic in the population of patients with traumatic multiple rib fractures. This section of lung function test at the pre- analgesic assessment showed that no patient recorded >100% of predicted value, 6.3% patients recorded 91 – 100% of expected while 15.6% patients recorded 61 – 70% of predicted value. The remaining 78.1% of patients recorded moderate FEV_1 values of 71–80% (32.8% patients) and (45.3% patients) 81-90% of predicted FEV_1. With the commencement of analgesia, FEV_1 significantly improved from the one hour to the 24 hours re-assessments. At one hour re-assessment, the mean FEV_1 became 93.5% predicted characterized by 7.8% of patients achieving FEV_1 >100% predicted, 67.2% patients achieving 91 – 100% predicted while no patient had low FEV_1 of 61 – 70% predicted (p <0.0001). The moderate value of FEV_1 (71 – 90% predicted) was recorded in only 26.3% of patients at the one hour re-assessment. The further analysis of FEV_1 component of respiratory function test at 24 hours showed a further improvement in FEV_1 with a mean value of 101.3% predicted. Almost all patients (96.8%) recorded very high predictive value of FEV_1; 91-100% predicted in 35.9% of patients and >100% predicted in 60.9% of patients. Only 3.1% of patients recorded moderate value of 81-90% predicted and non recorded low value. (p=0.00001) (Table 5).

Table 6 is the analysis of the FEV_1/FVC ratio (FEV_1%) of the 64 patients with traumatic multiple rib fractures extracted from the three spirometric tests done before administration of analgesic, one hour after administration and 24 hours after commencement of analgesic. Before analgesic the FEV_1% was low among the study population with no patient recording FEV_1% value >100% predicted, only 4.7% patients recording FEV_1% value of 91-100% predicted, while the majority of patients (78.2%) recorded moderate FEV_1% value of 71-90% predicted, and still 17.2% of the patients had low FEV_1% value <70% predicted with pre-anaesthetic FEV_1% mean of 79.9% predicted. However one hour after commencement of analgesia, the repeat FEV_1% showed remarkable and significant improvement in the study with the majority of patients (63.0%) having high FEV_1% values while the remaining 37.0% of patients had moderate FEV_1% values leaving no patient with low FEV_1% values with a p-value = 0.001. At 24 hour re-assessment point majority of patients (65.6%) were still able to maintain a high FEV_1% value of 90-100% predicted, while the remaining 34.4% of patients had moderate value of 71-90% predicted FEV_1%, giving a mean value of 90.6% predicted FEV_1% (p=0.0489).

Table 3. Chest pain score of patients at different period of analgesia

Chest pain score (4-point verbal rating scale)	Total n=64 (%)	Statistical indices
Before analgesia		
No pain (0)	0 (0)	
Mild (1)	0 (0)	
Moderate (2)	20 (31.3)	
Severe (3)	44 (68.7}	
1 hour into analgesia		
No pain (0)	4 (6.3)	Pvalue<0.0001
Mild (1)	29 (45.3)	
Moderate (2)	27 (42.2)	
Severe (3)	4 (6.3)	
24 hours into analgesia		
No pain (0)		P value=0.02
Mild (1)	49 (76.6)	
Moderate (2)	15 (23.4)	
Severe (3)		

Table 4. Percentage predicted of FVC of blunt chest trauma patients at different periods of analgesia

% Predicted of FVC	Frequency (%)	Statistical indices
Before analgesia		
➢ 100	0 (0)	
91-100	5 (7.8)	P value=0.81
81-90	30 (46.9)	
71-80	20 (31.3)	
61-70	9 (14.1)	
I hour into analgesia		
➢ 100	4 (6.3)	P value= 0.001
91-100	44 (68.8)	
81-90	14 (21.9)	
71-80	2 (3.1)	
61-70	0 (0)	
24 hours into analgesia		
91-100	0 (0)	P value= 1.000
81-90	42 (65.6)	
71-80	18 (28.1)	
61-70	4 (6.3)	

Table 5. Percentage predicted of FEV_1 of blunt chest trauma patients at different period of analgesia

% Predicted FEV	Frequency (%)	Statistical indices
Before analgesia		
➢ 100	0 (0)	
91-100	4 (6.3)	P value=0.978
81-90	29 (45.3)	
71-80	21 (32.8)	
61-70	10 (15.6)	
1 hour into analgesia		
➢ 101-110	5 (7.8)	
91-100	40 (67.2)	P value<0.0001
81-90	15 (23.4)	
71-80	1 (2.9)	
61-70	0 (0)	
24 hour into		
➢ 101-110	39 (60.9)	
91-100	23 (35.9)	P value=0.644
81-90	2 (3.1)	
71-80	0 (0)	
0 (0)	0 (0)	

Table 7 depicts the forced expiratory flow during the 25 – 75% interval of forced expiration (FEF 25-75) of the 64 patients with blunt traumatic multiple rib fractures before administration of analgesic, one hour after commencement of analgesic and 24 hours after commencement of analgesic. Before commencement of analgesic, only 4.7% of the patients had FEF 25-75 in the range of 91-100% predicted, while the majority (84.4%) had moderate range (71-90% predicted) value of FEF 25-75. The remaining 10.9% had low FEF 25-75 value of the range <70% of predicted value. With commencement of analgesic, the repeated respiratory function tests showed an improvement in the FEF 25-75 at the re-assessment points. At the first hour re-assessment, four (6.3%) patients were able to achieve FEF 25-75 value >100% predicted, another 57 (89.1%) patients achieved moderate range (71-90% predicted) value of FEF 25-75, leaving 4.7% patients with low FEF 25-75 (<70% predicted) value (about 58% reduction) which enabled the mean value to appreciate to 92.0% predicted against the pre-analgesia mean of

79.9% predicted (P-value = 0.014). Re-assessment at 24 hours also shows maintenance of the improvement over the pre-analgesia recording. Although no patient had FEF 25-75 value in the range of >100% predicted, none had low range (<70% predicted) value. The majority of the patients (58.1%) still had high FEF 25-75 (91-100% predicted) while the remaining 41.9% patients had moderate (71-90% predicted) range of FEF 25-75 at the 24th hour reassessment (p=0.044).

Table 8 depicts the forced expiratory flow (FEF) of the 64 adult patients with traumatic multiple rib fractures recorded before commencement of analgesia, at one hour after commencement of analgesia and finally at 24 hours after commencement of analgesia. Before analgesia, none of the 64 patients achieved >100% predicted FEF, 7.8% achieved 91-100% predicted, 46.8% achieved 81-90% predicted, while 37.5% fell into 71-80% predicted and 7.8% into 61-70% predicted range.

Table 6. Predicted FEV_1/FVC of blunt chest trauma patients at different period of analgesia

% Predicted of FEV_1/FVC	Frequency (%)	Statistical indices
Before analgesia		
➢ 100	0 (0)	
91-100	3 (4.7)	P value=0.690
81-90	33 (51.6)	
71-80	17 (26.6)	
61-70	11 (17.2)	
1 hour into analgesia		
➢ 100	5 (9.3)	
91-100	29 (53.7)	P value=0.001
81-90	17 (31.5)	
71-80	3 (5.6)	
61-70	0 (0)	
24 hour into analgesia		
➢ 100	0 (0)	
91-100	42 (65.6)	
81-90	16 (25.0)	P value=0.489
71-80	6 (9.4)	
0 (0)	0 (0)	

Table 7. Percentage predicted of FEF 25-75% of blunt chest trauma patients at different period of analgesia

% predicted of FEF 25-75%	Frequency (%)	Statistical indices
Before analgesia		
➢ 100	0 (0)	
91-100	3 (4.7)	P value<0.431
81-90	30 (46.9)	
71-80	24 (37.5)	
61-70	7 (10.9)	
1 hour into analgesia		
➢ 100	4 (6.3)	
91-100	40 (62.5)	P value=0.014
81-90	17 (26.6)	
71-80	3 (4.7)	
0 (0)	0 (0)	
24 hour into analgesia		
➢ 100	0 (0)	
91-100	36 (58.1)	P value=.441
81-90	15 (24.2)	
71-80	11 (17.7)	
0 (0)	0 (0)	

FEF25-75 means forced expiratory flow during the 25-75% interval of forced expiration

Table 8. Percentage predicted of FEF of blunt chest trauma patients at different period of analgesia

FEF (% predicted)	Frequency (%)	Statistical indices
Before analgesia		P value<0.431
>100	0 (0)	
91-100	5 (7.8)	
81-90	30 (46.8)	
71-80	24 (37.5)	
61-70	5 (7.8)	
1 hour after analgesia		
>100	4 (6.2)	
91-100	30 (46.8)	P=0.0003
81-90	24 (37.5)	
71-80	5 (7.8)	
61-70	1 (1.5)	
24 hours after analgesia		
>100	0 (0)	P value=0.441
91-100	36 (56.3)	
81-90	22(34.4)	
71-80	6 (9.4)	
61-70	0 (0)	

The mean FEF of the 64 patients before analgesia was 84.8% of predicted FEF value. Following commencement of analgesia, the first hour re-assessment showed that 6.3% of the patients started achieving >100% predicted FEF value, while 46.8% achieved 91-100% predicted FEF, 37.5% patients achieved 81-90% predicted FEF, 7.8% of patients had FEF value of 71-80% predicted with only 1.5% still having 61-70% predicted FEF. The mean FEF of the 64 patients at one hour after commencement of analgesia was 92.2% predicted which was statistically significant with p = 0.0003. At 24th hour re-assessment, 56.3% of patients had FEF value of 91-100% predicted, while 34.4% had FEF value in the range of 81-90% predicted and the remaining 9.4% patients 71-80% predicted value of FEF. The mean FEF of all the patients at the 24th hour re-assessment was 89.0% predicted which was numerically significant over the pre-analgesia mean (p=0.441).

4. DISCUSSION

Multiple rib fractures in blunt chest trauma patients are associated with significant morbidity and mortality as a result of hypoventilation leading to atelectasis, pneumonia, and respiratory failure. Pain management was first recognized as an important factor in preventing complications in these patients. Later, management of the respiratory system became more widely recognized as a major factor in patients' care. It is now known that patients with multiple rib fractures benefit most from adequate pain control, rapid mobilization, and meticulous respiratory care to prevent complications [6]. Evaluation of the patients' chest pain status also gave credence to pain control following the commencement of analgesic. At the pre-analgesic stage of assessment, the 64 patients rated their chest pain as either severe (68.7%) or moderate (31.3%) whereas at one hour after commencement of analgesic, only 6.3% and 42.2% still rated their chest pain as severe and moderate pain respectively, while 45.3% had mild pain and 6.3% had no pain. And at 24 hours all the 64 patients had either no chest pain (76.6%) or mild pain (23.4%) (Table 3). The chest pain control measured with changes in the pain scores was statistically significant at both periods of re-assessment (p values <0,0001 and 0.002). This has corroborated the fact that both intravenous tramadol injection and intercostals nerve block can attenuate moderate and severe chest pain of multiple rib fractures [3]. The overall effect of pain control in the 64 patients reflected in the improvement in pulmonary function measured with lung function machine (spirometer). There were positive improvement in the various components or the parameters measured during lung function tests over the baseline (pre-analgesic) values, (Tables 4-8).

Before administration of analgesic the forced vital capacity (FVC) of the 64 patients was low with mean of 80.3% predicted value. However at one hour and 24 hours post commencement of

analgesic re-assessment periods, there was improvement in FVC as a direct result of the effect of relief of chest pain on pulmonary function test. The first hour mean was 93.3% of predicted value, while the 24th hour mean was 91.4% predicted value which denoted improvement over the baseline value. In these patients who have achieved optimal control of chest pain, respiration is deep enough to open alveoli in all broncho-pulmonary segments of the lungs and thereby preclude the development of atelectasis, pneumonia, bronchiectasis, and lung abscess which can progress to respiratory failure and death as noted in a recent study [7].

The next and subsequent parameters of the pulmonary function test of the 64 patients with blunt traumatic multiple rib fractures continued to show consistent post-analgesic improvement over the pre-analgesic values with statistical significance. The forced expiratory volume at first second (FEV_1) mean of the 64 patients before analgesia which was 79.9% predicted became 93.5% predicted at one hour and 101.3% predicted at 24 hours. A related Saudi Arabian study by Osinowo et al. only assessed the changes in pain score, PaO_2, and peak expiratory flow rate of 21 patients with blunt traumatic rib fractures following intercostals nerve block for pain control [4]. Full pulmonary function test was not carried out on the study subjects.

The FEV_1/FVC ratio (FEV_1%) also showed the same pattern of positive changes as the other components of lung function test in the study. Before administration of analgesia the mean FEV_1% of the 64 patients was 79.9% predicted which improved following commencement of analgesia to 91.7% predicted at one hour and 90.6% predicted at 24 hours.

The FEF 25-75% mean of the 64 patients with blunt traumatic multiple rib fractures before administration of analgesic was 79.9% predicted value while those at one hour and 24 hours after commencement of analgesia were 92% predicted and 89% predicted respectively. This improvement in the post analgesic mean of FEF 25-75% at both the first and 24th hour re-assessments is in support of improvement in respiratory mechanics made possible by the relief of chest pain in the patients.

Forced expiratory flow (FEF) component of pulmonary function test of the 64 patients who sustained blunt chest trauma and multiple unilateral rib fractures improved significantly after administration of analgesic on the patients when compared to the reading before administration of analgesic. Before analgesics the FEF mean of the 64 patients was 80.0% predicted, whereas following commencement of analgesic administration, the FEF mean was 90.2% predicted at the first hour and 89.6% predicted at the 24th hour. The difference in the pre-analgesia FEF mean and the one hour post-analgesia FEF mean was statistically significance ($p<0.0001$).

The present study has corroborated other studies which have alluded to the benefits of pain control in multiple rib fractures. Thoracic epidural analgesia has been the preferred modality of pain control in rib fracture and commonly practice in most centres now [8]. This study however utilized intercostals nerve block and parenteral tramadol. Intercostals nerve block and systemic analgesic form the second and third tiers of modalities of chest pain relief in traumatic rib fractures, and a recent study has re-validated the superiority of ICNB over systemic analgesic [9]. A related study has further shown the positive effect analgesic in other aspects of respiratory function in thoracic trauma patients [10].

Various studies in different regions of Nigeria have documented on the characteristics of thoracic trauma in the country [11-17].

5. CONCLUSION

Analgesic is capable of reversing the abnormal lung function test parameters associated with chest pain of blunt chest injury and mitigate morbidity and mortality.

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CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX I

Proforma for data collection: Comparative study of regional and systemic analgesia for pain control in multiple rib fractures in adult blunt chest trauma patients in university of Uyo teaching hospital, Uyo, Akwa Ibom state, Nigeria

A) Biodata
Name ---------- Hosp Nos---------- Ward----------
Age ---------- Sex ---------- CXRay Nos ----------
Occupation ---------- Marital Status ----------
B) Clinical Data
Date of Presentation:..... Date of Admission:..... Date of Discharge:.....
Presenting Symptoms:.....
.....
.....
Clinical Diagnosis including mechanism of injury: .....
.....
Radiological Diagnosis: .....
.....
Specification of fractured ribs: .....
Specification of associated injuries if any:.....
.....
C) Analgesic Treatment Received
Type of analgesic: a] Intercostal nerve block [ ]
b] Intravenous tramadol [ ]
Rescue analgesia (intravenous pentazocine): Yes [ ] No [ ]
If yes how many doses: .....
Specify any other treatment received:.....
.....
Complication(s) of blunt chest trauma if any:.....
.....
Complication(s) of analgesic technique if any:.....
.....
D) Outcome Measures

Parameter	**Normal (% predicted) values**	**Before analgesia**	**1 Hour after commencement of analgesia**	**24 Hours after commencement of analgesia**
Respiratory rate (/min)	12-20			
SaO_2 (%)	>97			
Pain score	0			
FVC (L) (% predicted)	≥ 100			
FEV1 (L) (% predicted)	≥ 100			
FEV1/FVC (% predicted)	≥ 100			
PEFR (L/s) (% predicted)	≥ 100			
FEF2575(L/s) (% predicted)	≥ 100			

E) Overall Outcome: ……
……..

APPENDIX II

Consent form for comparative study of regional and systemic analgesia for pain control in multiple rib fractures in adult blunt chest trauma patients in university of Uyo teaching hospital, Uyo, Akwa Ibom state, Nigeria

Dear Sir/Madam,
We are conducting a research with two well established methods of pain relief in patients with multiple rib fracture as a result of blunt chest injury. When completed, the results of this research shall help us to know the most appropriate method of pain relief for our patients with multiple rib fractures as a result of blunt chest injury.
If you accept to take part in this research, you will receive one of the two methods of pain relief. Since both methods are well established, there are no harms that you will suffer because of taking part in this research. If you do not have adequate pain relief with the method of pain relief you are receiving, you will promptly be given additional treatment for pain. Although the testing period is only one day, you are also free to discontinue from the research even after you had accepted to take part in it.
If you have further questions please do not hesitate to ask us or any other doctors.
Please tick in a box below as appropriate:

Consent given [ ] Consent not given [ ]
Name:..... Signature:.....
Hospital number:.....
Thank you. Dr. Eyo E. Ekpe

Peer-review history:
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