THE TREATMENT OF STABBED CHESTS AT NGWELEZANA HOSPITAL, KWAZULU - NATAL

THULILE NGUBANE,
S. DE CHARMOY, C. EALES.

ABSTRACT: *A study was undertaken at Ngwelezana hospital to determine the requirements for a cost effective physiotherapy service for patients with stabbed chests. Forty male patients between the ages of 16 and 60 who had sustained unilateral penetrating stab wounds to the chest which required intercostal drainage were randomised into one of two groups on admission to Ngwelezana hospital.*

The patients in group I received physiotherapy immediately after insertion of the intercostal drain, while the patients in group 2 received physiotherapy 12 to 24 hours after insertion of the drain. Mean duration of intercostal drainage in group I was 2.35 days while that of group 2 was 7.55 days. This represented a significantly shorter drainage time for the patients who had been treated immediately after insertion of the drain.Patients were discharged from hospital on the day that the intercostal drain was removed. No complications were experienced by the patients in group 1 while four patients in group 2 developed an empyema.

The cost of the patients in group 2 exceeded the costs of those in group 1 by R78 728.00. It is thus imperative that patients admitted with stabbed chests should have physiotherapy immediately after insertion of the intercostal drain.

KEYWORDS: BREATHING EXERCISES, CHEST TRAUMA, PHYSIOTHERAPY

INTRODUCTION

Ngwelezana Hospital is situated six kilometres west of Empangeni and approximately 200 kilometres north of Durban in KwaZulu - Natal, South Africa. It has a bed occupancy of 758 beds and serves the following districts and areas as a secondary hospital: Ngoye district, Nseleni area, KwaMbonambi area, Nseleni area, Mtunzini area and the Empangeni district. This amounts to thirteen referral hospitals and nineteen clinics. The hospital, at the time of this study, was staffed by 73 medical doctors and one physiotherapist.

Muckart et al (1995) reported that the pattern of penetrating torso trauma in KwaZulu - Natal had changed considerably in the last decade. The incidence of stab wounds had declined by 30% while the incidence of gunshot wounds had increased by 800%. It is noteworthy that this survey was conducted in the Durban Metropolitan area which is the largest city in KwaZulu - Natal. While conducting this study it was the authors' perception that the incidence of stab wounds remains high in the more rural areas such as the areas which Ngwelazana hospital serves.

In a four year audit on stab wounds in Zimbabwe the following was found: the mean age of the patients was 30 years; 83 percent of the stabbing occurred at night while the other 17 percent occurred during the day. They also reported on the anatomical site of the stab wounds and found that 51 percent occurred in the chest with the remainder involving the thorax, upper limbs, head and neck. The authors of this audit reported a zero percent mortality rate and commented on the benign nature of the thoracic stab wounds (Muguti et al, 1995). Physiotherapy was not considered a treatment option or was not reported on in the audit. Stab wounds in the South African context seem to be more severe as they are associated with prolonged thoracic drainage times, increased infection rates and morbidity. These factors take up valuable resources, beds and staff and delay the return of the patient to normal functioning (Senekal and Eales, 1995).

The treatment of choice for patients presenting at Ngwelezana with stabbed chests includes pain medication, broad spectrum antibiotics, insertion of an intercostal drain and physiotherapy. The average intercostal drainage time for the patients in the hospital is between 4.72 and 5.27 days.

Since the early 1970's research has been undertaken in South Africa, to determine the role of physiotherapy in patients with penetrating injuries to the chest. According to Fairlie (1973), the aims of physiotherapy in patients with penetrating injuries to the chest are: to facilitate drainage of air/fluid in the pleural cavity; to ensure adequate ventilation and re-expansion of all areas of the lung; to prevent the accumulation of secretions; to prevent postural complications associated with the presence of an intercostal drain and to maintain full shoulder range of movement.

The treatment techniques used in the 1970's and today by physiotherapists are the same. Breathing exercises are used when patient co-operation can be obtained. Trunk exercises are used to move the intrapleural contents towards the site of the drain thus facilitating intercostal drain drainage. In addition the trunk exercises maintain muscle length and strength preventing the development of postural deformities. These exercises may be combined with the breathing exercises. General aerobic exercises such as running on the spot, climbing stairs and star jumps are used to increase respiratory rate, tidal volume and heart rate thus facilitating ventilation and perfusion. Coughing is interspersed with all the above exercises to clear any accumulated secretions and facilitate drainage due to an increase in intrapleural pressure generated by coughing (Fairlie, 1973; Hayes-Gregson, 1973).

Fairlie (1973), Rodseth et al (1978) and Senekal and Eales (1995) all compared two groups of patients with penetrating wounds to the chest. The first group

CORRESPONDENCE:
Thulile Ngubane
Chief Physiotherapist
Chris Hani Baragwanath Hospital
P.O. Box Bertsham
2013

received their physiotherapy treatment immediately after insertion of the intercostal drain. The other group were only treated by a physiotherapist between 8 and 60 hours after intercostal drain insertion. For all three of the studies the two groups received exactly the same treatment, only the timing of the treatment was different. In all three studies the duration of intercostal drainage, length of stay in hospital and prevalence of temperatures was significantly less for the group who received immediate physiotherapy treatment.

Lung function tests, forced vital capacity (FVC), forced expiratory volume in 1 second (FEV_1) and the FEV_1/FVC ratio, showed no significant difference between the groups (Fairlie, 1973; Rodseth et al, 1978; Senekal and Eales, 1995). There was however a significant difference between measurements taken while the intercostal drain was in situ, and once it had been removed (Senekal and Eales, 1995). This finding is not unexpected as pain due to the intercostal drain is likely to inhibit measurements which require forced expiration.

Due to the remaining high incidence of stabbed chests in the Ngwelezana area, and the fact that there is only one physiotherapist, it was considered important to repeat the study of Senekal and Eales (1995). A study was designed to determine whether there would be a difference in outcome in patients who received chest physiotherapy immediately after insertion of the intercostal drain compared to those patients who received chest physiotherapy 12 to 24 hours after insertion of the intercostal drain.

METHOD

All patients admitted to the wards from casualty with one under water drain for either a pneumothorax, a haemothorax, or a haemopneumothorax were considered for inclusion in the study. Patients were excluded from the study if they had more than one underwater drain, a documented history of tuberculosis, a tension pneumothorax or a sucking chest wound.

This study was conducted at the Ngwelezana Hospital in KwaZulu - Natal over a period of three months. Forty male patients between the ages 18 and 60 years with unilateral penetrating stab wounds to the chest were included in the study. The patients participating in this study were all haemodynamically stable on admission. All patients had a chest x-ray taken on admission which was repeated after insertion of the intercostal drain and at intervals dictated by the clinical progress of the patient.

The patients were divided into two groups according to the referral method. The patients assigned to group 1 (n = 20) were referred for physiotherapy by the doctors immediately after insertion of the intercostal drain. For the patients in group 2 (n = 20) physiotherapy commenced 12 to 24 hours after insertion of the intercostal drain. Under normal circumstances all patients admitted for stabbed chest injuries are treated by the physiotherapist sometime during the day following admission. Most admissions occur at night. For the purposes of this study the doctors working in the casualty unit were all asked to refer the patients as soon as the intercostal drain had been inserted. Some of the doctors complied with this request while others did not. Those doctors who did refer patients immediately contributed to the patients in group 1 while those who did not refer at all, contributed to the patients in group 2.

Comparisons between the two groups were made using the following parameters; age of the patient, duration of intercostal drainage and hospitalisation, number of physiotherapy treatments, radiological resolution and the presence of complications.

The physiotherapy treatment consisted of the following regimen:

In sitting:

1. Unilateral lateral costal breathing, posterior basal breathing, diaphragmatic breathing.
2. Both hands behind the head; bend trunk forward and rotate to touch opposite knee with forehead. This was combined with inspiration and expiration and repeated 10 times.
3. Arms at side, alternate trunk side flexion. Repeated 10 times to both sides.
4. Hands on shoulders with elbows held out to the side, patient moves to touch left knee with right elbow and vice versa. Repeated 10 times to both sides.

For exercises 2, 3 and 4 above expiration occurred on trunk flexion and inspiration on trunk extension.

5. Coughing
6. Brisk walking on the spot (lifting knees to the level of hips) for one minute
7. Repeat above deep breathing exercises.
8. Coughing

In standing:

1. Arm elevation with inspiration followed by flexion and toe touching on expiration - repeated ten times.
2. Arms at sides, alternate trunk side flexion - repeated ten times to both sides.
3. Arms yard - circular movements of the arms - repeated ten times.
4. Deep breathing exercises - unilateral lateral costal breathing, posterior basal breathing and diaphragmatic breathing.
5. Coughing
6. Stride standing, arms yard, bend and touch right foot with left arm, return to starting position and then vice versa - repeated to both sides ten times.
7. Brisk walking on the spot - two minutes.
   Brisk walking around the ward - two minutes.
   Running up and down stairs - two minutes.
8. Repeat deep breathing exercises.
9. Coughing followed by blowing up a balloon six times.

For exercises 1, 2 and 6 expiration occured during trunk flexion and inspiration during trunk extension.

Patients were also encouraged to walk around, cough and to do deep breathing exercises on their own between treatments.

The above treatment was continued twice daily until discharge of the patients in both groups. All patients were discharged when radiological resolution of the initial injury was demonstrated and the intercostal drain had been removed. Discharge occurred on the same day as removal of the intercostal drain.

RESULTS AND DISCUSSION

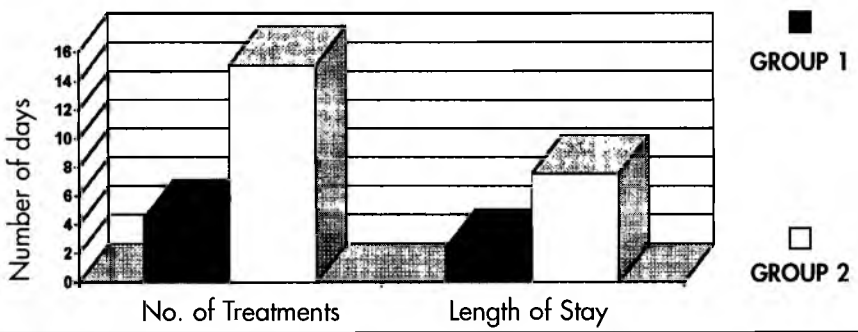
When comparing the two groups they were relatively well matched for age. The age range for the patients in group 1 was 17 to 34 years with a mean age of 25.5 years while that of group 2 was 16 to 60 years with a mean age of 31.85 years (see Table 1). Although there is a discrepancy in mean ages between the groups it was not considered to be significant ($p > 0.05$). The patients in group 2 who developed complications which prolonged their hospital stay, fell within the mean age range of the patients in group 1. It seems that the age of the patient did not contribute to the development of complications.

The results showed a significant improvement in the group receiving physiotherapy immediately after insertion of the intercostal drain (group 1) (Figure 1).

TABLE 1: RAW DATA FOR ALL PATIENTS IN THE STUDY

PATIENT NO.	GROUP 1 AGE	GROUP 1 NUMBER OF TREATMENTS	GROUP 1 LENGTH OF STAY	GROUP 2 AGE	GROUP 2 NUMBER OF TREATMENTS	GROUP 2 LENGTH OF STAY
1	26	6	3	30	44	22
2	24	4	2	19	12	6
3	31	6	3	16	22	11
4	27	2	1	23	10	5
5	27	44	2	33	16	8
6	26	4	2	21	12	6
7	26	6	3	22	8	4
8	25	4	2	60	10	5
9	24	4	3	50	12	6
10	19	4	4	24	10	5
11	27	6	3	60	10	5
12	30	6	3	46	16	8
13	21	4	2	22	36	18
14	20	2	1	25	12	6
15	31	4	2	21	12	6
16	34	4	2	42	10	5
17	23	6	3	42	8	4
18	24	6	3	26	10	5
19	17	4	2	35	8	4
20	28	2	1	20	24	12
Mean	25.5	4.4	2.35	31.85	15.1	7.55
Median	26	4	2	25.5	12	6
S.D.	±4.3	±1.4	±0.8	±13.65	±9.6	±4.8

FIGURE 1:
MEAN NUMBER OF TREATMENTS AND LENGTH OF STAY PER GROUP



There was a significant difference ($p < 0.01$) between the two groups with regard to the mean duration of intercostal drainage and hospital stay (group 1 = 2.35 ± 0.8 and group 2 = 7.55 ± 4.81). It is important to remember that patients were discharged immediately after removal of the intercostal drain. These results are in agreement with those of Fairlie, 1973; Rodseth et al, 1978; Senekal and Eales (1995).

Four of the twenty patients in group 2 developed complications while none of the patients in group 1 developed a complication. Patients 1, 3, 13 and 20 in group 2 all developed an empyema resulting in a prolonged hospital stay. These findings are again in agreement with those found by Senekal and Eales (1995).

In terms of physiotherapy cost, if one considers that in 1997 a single physiotherapy treatment as described above cost R 52.50 then the total cost of physiotherapy alone for the patients in group 1 was R 4 620.00 (88 * R52.50) and for those in group 2 R16 380.00 (312 * R52.50). In terms of hospital stay, the cost of a hospital bed at Ngwelezana in 1998 is R757.00 per day meaning that the difference in hospital cost between the two groups was R78 728.00 (47 days * R757.00 = R35 579.00 for group 1 and 151 * R757.00 = R114 307.00 for group 2).

While completing this study the following subjective observations were made. Firstly, all the patients admitted for stab wounds were admitted at night time. This finding is in agreement with Fairlie (1973); Hayse-Gregson (1973); Muguti et al (1995); Senekal and Eales (1995) who all found that the majority of patients with stabbed chests were admitted at night. Secondly, the patients who had had treatment the previous night (on admission) were up walking around the next day while those who had not had treatment were still very reluctant to move.

It would seem then that the results above confirm those of the Senekal and Eales (1995) study. The results also suggest that early, "aggressive" physiotherapy is a financial must for this patients population in the present South African financial climate. The saving of R 78 728.00 could be used to employ a further physiotherapist thus enhancing the physiotherapy service provided to the community that Ngwelezana serves.

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