THE USE OF ENTONOX IN CONJUNCTION WITH THE PHYSIOTHERAPY TREATMENT OF BURNS

M. J. Runnalls, Dipl. in Physiotherapy, C.T.P. (Cape Town) Senior Lecturer and Head, Department of Physiotherapy, University of Stellenbosch, Physiotherapist, Karl Bremer Hospital, Bellville and M. W. Stephan, B.Sc. in Physiotherapy (Stell.) Junior Lecturer, University of Stellenbosch, Physiotherapist, Karl Bremer Hospital, Bellville.

Introduction

Every physiotherapist is well aware of the problems that occur when treating patients with burns. On the one hand patients experience tremendous psychological trauma during the painful procedures necessary to maintain the range of movement of all the affected joints and to prevent the formation of contractures, but on the other hand it is no easy task for any physiotherapist to perform active-assisted movements when she knows full well that the patient will certainly have to experience a fair amount of pain.

In an attempt to overcome the pain element involved during physiotherapy treatment, Entonox, a relatively hazard-free medical gas was administered. Both the range of movement,[1] and the duration of the time in seconds taken to perform the required movement improved.

As no special burns unit exists, all patients with burns were treated with the closed technique in a general surgical ward.

Method

A random selection of 24 patients was submitted to testing. The testing was done every afternoon over a period of three days, the patients having already received the classical, prescribed physiotherapy treatments in the mornings.

The range of movement and the time in seconds taken by the patient to move through the various affected ranges were noted. On the first day of the testing series no gas was administered. On the second day medical O_2 was administered through a mouthpiece and the same valve as the Entonox apparatus. Finally on the third day Entonox was administered through a mouthpiece. Mouthpieces were used in preference to face masks to eliminate further infection and also discomfort where the face itself was burnt.

The patients were informed that the purpose of the administration of the various medical gases was merely to ascertain which gas would enable them to perform the required movement to the best of their ability. At no time was any mention made of the pain relieving element.

The patients held the mouthpieces themselves during the administration of the Entonox. In this way it was ensured that administration of the gas ceased should the patient lose consciousness as the mouthpiece would then be released automatically.

Each patient was instructed to inhale fully for 12-20 breaths. Thereupon the patients were required to do the movements to the best of their ability without assistance. The total range of movement and the time taken to perform this movement were noted.

ANALYSIS OF CASES DATA
t-test Results

		t	*p*
No gas vs Medical O_2	Movement	0,02	$>0,05$
	Time	0,6631	$>0,05$
No gas vs Entonox	Movement	3,2	$0,01> p>0,001$*
	Time	2,8	$0,01> p>0,001$†
Entonox vs Medical O_2	Movement	4,09	0,001 p‡
	Time	2,44	0,01†

MEANS

	Movement	Time
No gas	54,425	22,40
Medical O_2	54,700	28,85
Entonox	67,125	16,90

* = Significant.
† = Very significant.
‡ = Highly significant.

Patient using the Entonox apparatus.

RESULTS

Patient	Age	Sex	Race	Joint	Movement	Range of Movement in °			Time in seconds		
						Before	Med. O_2	Entonox	Before	Med. O_2	Entonox
N.M.	24	F	N.E.	Wrist	Flexion to extension	39°	30°	45°	20″	20″	20″
I.S.	32	F	N.E.	Shoulder	Abduction	60°	56°	60°	22″	22″	16″
				Elbow	Flexion to extension	35°	36°	40°	38″	41″	27″
J.F.	28	F	N.E.	Hip	Flexion to extension	57°	57°	48°	17″	17″	17″
					Abduction	36°	30°	46°	8″	10″	13″
M.O.	24	F	N.E.	Elbow	Flexion to extension	112°	114°	104°	13″	23″	9″
				Shoulder	Abduction	55°	48°	40°	17″	18″	11″
J.T.	32	F	N.E.	Knee	Flexion to extension	93°	92°	59°	12″	19″	14″
.T.	42	F	N.E.	Shoulder	Abduction	40°	30°	65°	39″	23″	51″
				Elbow	Flexion to extension	23°	17°	26°	52″	56″	23″
				Wrist	Flexion to extension	20°	25°	28°	45″	31″	17″
M.M.	34	F	N.E.	Elbow	Flexion to extension	23°	47°	69°	15″	29″	36″
				Wrist	Flexion to extension	37°	31°	65°	17″	27″	22″
N.M.	29	F	N.E.	Shoulder	Abduction	73°	66°	75°	10″	7″	14″
A.N.	13	F	N.E.	Knee	Flexion to extension	81°	47°	72°	35″	22″	22″
				Hip	Flexion to extension	43°	16°	48°	27″	21″	26″
					Abduction	10°	10°	30°	21″	18″	21″
K.J.	4	F	N.E.	Elbow	Flexion to extension	85°	91°	37°	11″	52″	24″
S.J.	3	F	N.E.	Elbow	Flexion to extension	114°	114°	111°	41″	6″	6″
C.P.	5	M	N.E.	Elbow	Flexion to extension	20°	15°	25°	15″	20″	17″
J.C.	18	M	N.E.	Wrist	Flexion to Extension	50°	72°	116°	17″	8″	9″
				Hip	Flexion to extension	73°	63°	80°	13″	22″	10″
				Elbow	Flexion to extension	113°	123°	135°	18″	11″	6″
N.K.	22	M	N.E.	Wrist	Flexion to extension	10°	10°	38°	17″	22″	12″
				Elbow	Flexion to extension	12°	26°	55°	37″	20″	25″
P.K.	42	M	N.E.	Knee	Extension to flexion	80°	80°	94°	57″	48″	31″
P.K.	11	M	N.E.	Elbow	Flexion to extension	42°	75°	90°	11″	11″	10″
				Wrist	Flexion to extension	17°	36°	38°	21″	26″	12″
M.W.	31	M	N.E.	Elbow	Flexion to extension	79°	80°	101°	12″	9″	9″
W.R.	12	M	N.E.	Hip	Flexion to extension	65°	73°	90°	55″	17″	11″
					Abduction	10°	11°	26°	14″	15″	6″
D.A.	33	M	N.E.	Shoulder	Abduction	46°	45°	48°	12″	12″	16″
				Elbow	Flexion to extension	65°	64°	73°	15″	13″	9″
D.B.	42	M	N.E.	Shoulder	Abduction	54°	46°	51°	17″	27″	18″
H.J.	13	M	N.E.	Wrist	Flexion to extension	54°	50°	95°	15″	13″	22″
S.S.	43	M	N.E.	Shoulder	Abduction	34°	37°	42°	23″	29″	23″
				Elbow	Flexion to extension	60°	55°	66°	17″	17″	19″
H.A.	52	F	E.	Wrist	Flexion to extension	73°	85°	105°	16″	13″	7″
				Elbow	Flexion to extension	69°	102°	119°	22″	10″	8″
J.L.	28	M	E.	Wrist	Flexion to extension	115°	86°	129°	7″	9″	7″

Discussion

From the above analysis it is clearly demonstrated that when Entonox was used (1) the further increase in the range of movement was highly significant and (2) the decrease in the time taken to perform each movement was very significant. It can be seen that when no gas and medical O_2 were used there was no difference in the measurable quantites. As regards the means it is evident that there is virtually no difference between the values of the use of no gas and medical O_2 whereas there is an appreciable difference of the values when Entonox is used.

Finally in this study it was noticed that certain patients even although their readings were not as good, were definitely more enthusiastic in performing their movements, apparently due to less pain. Total analgesia is not always experienced especially in the case of patients with high alcohol consumption. These patients, however, although they still experience pain seem to react more favourably to physiotherapy treatment aided by Entonox.

A subjective conclusion was evident from many of these patients who volunteered that treatment was much more comfortable when Entonox was administered.

Conclusion

From the results obtained it seems clear that Entonox has a role to play in relieving the pain element during physiotherapy treatment to maintain joint range and prevent contractures in the patient suffering from burns and enabling their rehabilitation to be more pleasant.

References

[1] Joint Motion, Method of Measuring and Recording, American Academy of Orthopaedic Surgeons, 1965.

ACKNOWLEDGEMENTS

1. *Prof. P. A. Foster, M.B., Ch.B. (Cape Town), F.F.A., R.C.S.I., D.A. (Dublin), D.A. (London) and Dr. J. F. Coetzee, B.Sc., M.B., Ch.B. (Univ. Stell.) Department of Anaesthesia, University of Stellenbosch and Karl Bremer- Hospital, Bellville.*
2. *Prof. J. J. W. van Zyl, M.B., Ch.B., (Cape Town), M.D. (Stell.), F.R.C.S. (Edin.), Department of Surgery, University of Stellenbosch and Karl Bremer Hospital, Bellville.*
3. *J. F. Coetzee, B.Sc., M.B., Ch.B. (Univ. Stell.) Department of Anaesthesia, Karl Bremer Hospital, Bellville.*
4. *The Department of Meidcal Computing, Hospital Services, Cape Provincial Administration.*
5. *Mrs. U. Soetemann, Physiotherapist, Tygerberg Hospital, Tiervlei.*

Opsomming

Die gebruik van Entonox, 'n relatiewe veilige mediese gas, wat die vermoë het om pyn te verlig, tesame met die fisioterapeutiese behandeling van brandwonde, is bespreek. Fisioterapeutiese behandeling sonder enige mediese gas, met mediese O_2 en met Entonox is gegee. Die omvang van beweging is gemeet sowel as die tyd in sekondes waartydens beweging uitgevoer is, is geneem. Die lesings is statisties vergelyk en dui aan 'n verdere verbetering in die omvang van beweging sowel as 'n afname in tyd geneem om die beweging uit te voer.

Uit die resultate verkry, blyk dit duidelik dat Entonox 'n rol het in die verligting van die pynelement gedurende die fisioterapeutiese behandeling om gewrigsomvang te behou en om kontrakture te voorkom van die pasiënt wat brandwonde het en om hulle rehabilitasie te vergemaklik.

Phsiotherapy services at the S.A. Games

To complete the Medical Services provided at the Games, the Northern Transvaal Branch was approached by the Secretariat to provide Physiotherapy Services, on a continuous basis, for the duration of the Games.

A Committee of four Physiotherapists, Private Practitioners and Hospital Staff, was formed, together with the Liason Officer of the Secretariat Mr. Louw de Beer, who was absolutely magnificent in obtaining all and everything required.

In co-operation with the First Aid Units on duty, four main stations were manned viz., three at the Games Venues and a complete Department in the Hotel. Ice was made available at all the Venues, and together with strapping of such injuries which made continuation of the event possible to the Athlete, nothing further was considered necessary. More serious injuries were either referred for Hospital check or sent to the Hotel.

The Physiotherapy Department at the Hotel was staffed throughout the period of the Games by two Physiotherapists at a time, in three shifts. Starting at 8.30 a.m., 2 day shifts came on and from 5.30 p.m. the night shift were officially on duty till 10 p.m. Very often however, the latter had to work till 11 p.m. and once or twice till after 12 midnight.

All Apparatus was available and an Ice Making Machine was specially installed in a small kitchen next to the Department.

The whole operation was considered highly satisfactory and the co-operation with the First Aid Units was an especially pleasing feature.

Special Treatment Cards had been printed to provide an immediate record of procedures required, especially necessary as an injury was seen by a different Physiotherapist each time the patient reported for attention.

It is hoped that some analysis of types of injuries, treatment procedures etc. will possibly still be forthcoming from the information contained on these Cards.