THE USE OF PROTEOLYTIC ENZYMES (CHYMORAL) IN SPORTING INJURIES*

W. F. (ROB) RATHGEBER, M.B., B.CH. (RAND), Durban

exact mode of action of proteolytic enzymes in the lution of accidental or postoperative oedema is not vn. Many workers have suggested that these drugs k down fibrous material, blocking the lymphatics and llaries, thereby restoring microcirculation. The theory, ever, still remains to be proved as are also the exact leading to the build-up of inflammatory oedema.

pharmacological effects both in the general processes igestion and at tissue level. Ambrus *et al.*¹ have shown chymotrypsin and trypsin can be absorbed across abdominal wall. This itself appeared to be a factor was initially queried by many members of the medical scientific professions. They went on to say that the that proteolytic enzymes could not be absorbed use of their molecular size could be discounted as ecules of 10 times their size could be shown to be orbed. Ambrus *et al.* showed that when enzymes were in with food a considerable amount of their activity lost in the normal digestive processes. It is therefore ntial that the proteolytic enzymes should be taken in the stomach is empty, preferably $\frac{1}{2}$ - 1 hour before ls.

ie et al.² were able to use objective parameters in ssing the value of the proteolytic enzymes in postrative trauma of the hand. The circumferential surements of the fingers and palms were taken prepostoperatively and a comparison was made between ents using either Chymoral or a placebo. The results ained showed a statistically significant improvement he patients taking the active drug, reducing the time resolution of inflammatory oedema by 50%.

lonstein³ was able to show considerable improvement boxers who used proteolytic enzymes both prophylically and therapeutically. In this trial the double-blind mique was used and the patients taking the active drug wed an excellent response in respect of the time of overy. Similar results were obtained by Boyne and dhurst⁴ when using proteolytic enzymes in accidental ma associated with footballers and comparing the alts of two seasons' injuries. Shaw⁵ and Lie et al.² have lerlined the importance of reducing inflammatory ema. They state that this often becomes fibrinous and y eventually reduce the mobility of the limb or termi-extremity. Pain and discomfort are prolonged and imatic oedema often indirectly gives rise to scarring.

The essential point to bear in mind in relating the alts of these trials to trauma associated with sporting tries, is that if key personnel are away from their m for considerable periods of time their morale is uced and their fitness is lost due to long periods away m participation in games or training. It is also difficult encourage continued fitness despite rehabilitation prommes, if a player is injured. If, therefore, time lost to accidental trauma can be reduced and the players arned to full function, considerable economies can be exted in the general running of sporting organizations.

It is also important from the players' point of view, particularly if they are professionals, as not only do they suffer pain and discomfort associated with accidental trauma, but they may also suffer financial loss in their inability to participate.

The resolution of inflammatory oedema, bruising and swelling is difficult to assess objectively. Over a period of years familiarity with the normal recovery processes can be estimated objectively if the doctor concerned regularly attends to these types of injuries. This is particularly so if patients are suffering from trauma associated with areas of the body that cannot easily be measured, such as the head and chest.

It was therefore decided to complete work on a varied selection of cases suffering from soft-tissue damage as a result of sporting injuries, using either Chymoral or placebo in a double-blind trial. The patients were often seen at the sporting events where they sustained the injury and the doctor was responsible for supervising the requirements of personnel in the field, or occasionally in casualty departments of local hospitals. The object of the trial was to return the patient to play as quickly as possible by the resolution of traumatic oedema which would consequently hasten healing time.

MATERIALS AND METHODS

The patients incorporated in the trial were those suffering from sporting injuries. These were sustained in various types of activities, including football, rugby, tennis, cricket, squash racquets and athletics. The types of injuries were soft-tissue damage to virtually every part of the body, including the hands, feet, head, chest, knees and ankles, as indicated in Table I. In some cases stitching and pressure strapping were required, and in all cases routine emergency treatment was employed.

TABLE I. SITES OF INJURIES

In	jury			CF	nymoral	Placebo		
Lower le	eg ar	nd an	nkle			6	5	
Toe						2	1	
Fingers						5	4	
Jaw						2	1	
Wrist						2		
Elbow						1		
Eve						1	1	
Thigh						1	4	
Head						3		
Groin							1	
Face							1	
Chest							1	
Knee			8.0				î	
	0.10	8.00						
Tota	al		٠.	٠.		23	20	

On entry into the trial full details of the nature and site of injury were entered on the patient's record card, together with emergency treatment given. Each record card was given a consecutive code number which corresponded with a container of tablets, and the patient was instructed to take 2 tablets 4 times a day, half an hour before meals. The tablets were either Chymoral or a

placebo prepared in identical form and packed in identical containers so that neither the doctor nor the patient knew which treatment was being received. The treatment was continued for 5 days. The patient was seen every day or every other day where possible so that an accurate assessment of his progress could be made.

The parameters used in assessing progress were: bruising and swelling—classified as nil, minimal, moderate and severe; the percentage return of full function; and fitness to resume play.

RESULTS

When the code was broken it was found that 26 patients received the active drug while 20 patients received the placebo drug. Three patients receiving the active drug were excluded from the trial for various reasons—thus leaving only 23 patients receiving the active drug for analysis.

The age range of the patients in the trial was comparable, viz.: patients receiving Chymoral were aged 6-36 years (average 22 years) and patients receiving the placebo were aged 9-40 years (average $26\frac{1}{2}$ years).

It was found that in the parameters bruising, swelling and return to full function, there were exclusions. These are noted in the results column as the patients did not register any degree of either bruising or swelling, and in return to full function this did not apply as 3 of the patients receiving Chymoral sustained head injuries, and 1 patient receiving the placebo was incapacitated with a bruised penis as a result of a kick in the groin. The results were compared on the sixth day as this was the day when all the patients had completed the course of treatment and no further therapeutic effect could be anticipated. In the estimate of return to full function it was decided to record the patients who had more than 80% of full function as a fair assessment of recovery (Table II).

DISCUSSION

Statistically significant results were obtained in 3 of the 4 parameters: bruising, return to function, and fitness to

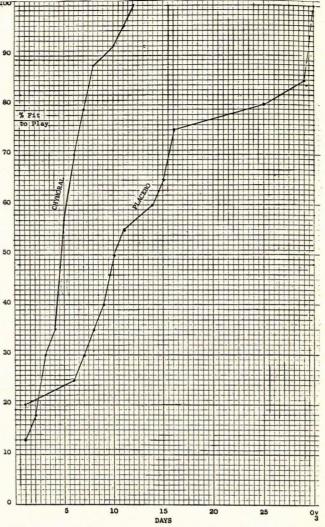


Fig. 1. Cumulative percentage of cases fit to play on days throughout the trial.

TABLE II. PROGRESS OF THE PATIENTS

	Days									0	0/					
Devisions resolution in Jane	Excl.	1	2	3	4	5	6	7	8	9	10	11	Over 12	recovery on 6th day	p value	
Bruising—resolution in days Patients receiving Chymoral No bruising		5	1	1		1	3	3	3	2				4	50	Significant P<0.02
Patients receiving placebo No bruising		4				1		1	1	1	1	2	1	8	12.5	1 0 02
Swelling—resolution in days Patients receiving Chymoral No swelling		4		1		2	4	3	3	3	1		1	1	53	Not
Patients receiving placebo No swelling		6				1	2	1			1	1		8	29	significant P<0·16
Return to full function—in (minimum 80%)	days						,									
Patients receiving Chymoral Excluding head injuries		3	1	1		2	6	3	2	1	2			2	65	Significant P<0.01
Patients receiving placebo Excluding bruised penis		1	1					2		1	2	3	2	8	16	
Patients receiving Chymoral			3	1	3	1	5	3	1	3		1	1	1 12	70 20	Significant
Excluding bruised penis Fit to play—in days		1	3 4	1	3	1	5	3	1	3		1 1	1 1	1 12	70 20	Significant P<0.01

E III. NUMBER OF CASES FIT TO PLAY AND % FIT TO PLAY ON DAYS THROUGHOUT TRIAL

s receiving Chymoral			Cases receiving placebo							
v	No. fit to play	fit to play	Day	No. fit to play	% fit to play					
	3	13	1	4	20					
	4	18	6	5	25					
	7	30	7	6	30					
	8	35	8	7	35					
	13	57	9	8	40					
	16	70	10	10	50					
	18	79	11	11	55					
	20	88	14	12	60					
	21	92	15	13	65					
	22	96	16	15	75					
	23	100	25	16	80					
			28 Over	17	85					
			30	20	100					

r, and in each case the probability was less than 0.02. lough there was a considerable reduction in swelling the sixth day in 53% of the patients receiving the ve drug as compared with 29% of the patients reing the placebo on the same day, this was not statislly significant (Table II).

hroughout the trial it is interesting to note the number cases that were either resolved or recovered before 12th day in the patients receiving Chymoral as comed with those receiving the placebo. It is normally cipated in these types of injuries, serious enough to 1 medical attention, that the approximate time of reery, and therefore fitness to play, can be as long as 21 days. In the trial, and with the use of Chymoral, period was considerably reduced. Accumulated cases

in the various parameters showed that only 8 cases had not been resolved in 12 days, using Chymoral, whereas there were 36 recordings of cases using the placebo.

Table III and Fig. 1 show the number of patients and the percentage of patients who had recovered sufficiently to play, on the days throughout the trial, and clearly illustrate the difference in effectiveness of the two drugs, Chymoral and placebo. The average time for recovery of patients receiving Chymoral was $8\frac{1}{2}$ days and for patients receiving placebo 17 days.

SUMMARY

A double-blind trial with either Chymoral or a placebo, on patients sustaining injuries due to accidental trauma in sport, was completed on 43 cases.

Statistically significant results were achieved in 3 of the 4 parameters used, namely bruising, return to function, and fitness to resume play. Although there was a considerable reduction in the resolution of swelling in patients taking Chymoral as compared with the placebo, this result was not statistically significant. The assessment of the resolution of inflammatory oedema in large limbs, chest and head is sometimes difficult, and this is probably the reason why a significant result was not achieved in this parameter. The speed of the recovery of patients treated with Chymoral is extremely valuable in maintaining the important morale, personal fitness and skill of the individual players.

It must be remembered that the patients treated were those who were fit and active, where the normal recovery rate is expected to be good. If it is possible, therefore, to improve the normal recovery rate this is not only economically valuable, but worthy of note from the clinical point of view.

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