

REMARKS ON THE PROGNOSIS OF THE
POSTTRAUMATIC DYSTROPHY OF THE EXTREMITIES¹

BY
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In his monograph², *Haldbo* has given a valuable contribution to the establishment of our conception of posttraumatic dystrophy of the extremities as a clinical entity—a view which, like *Kienböck* and *Leriche*, *Sudeck* has also advocated in his later works. This is the nosographic picture which previously was designated as *Sudeck's atrophy*—posttraumatic osteoporosis, posttraumatic hard edema—because attention was paid especially to the predominant morbid feature. But, which one of the cardinal symptoms—changes in the bones, edema, pain, function, of disturbances or other vegetative disturbances—may dominate the clinical picture of the affection is of no particular importance to the diagnosis, as all the symptoms only signify that the traumatic injury in the somatic and vegetative system has reflexly elicited a dysfunction together with the resulting tissue reactions. As yet the significance of the individual factors has not been fully elucidated, nor has the mechanism involved in the more severe changes in the biology of the tissues—changes which fortunately are relatively rare.

Through his studies of the clinical signs of the dystrophy, especially the characteristic sudoral and vasomotor disturbances,

¹ Read at the meeting of the Scandinavian Orthopedic Association Stockholm, June 27, 1947.

² Hroar Haldbo: Posttraumatisk Extremitetsdystrofi, Dissertation. Copenhagen 1942.

Halbo has made it possible for the clinician both to substantiate the diagnosis in the mild and moderate cases of dystrophy, and also—and this is of particular importance—to make the diagnosis during the developmental stage of the dystrophy and thus make a rational therapy possible. Furthermore, the improved diagnosis will free some patients from being labelled as neurotic or exaggerating. Although the prognosis fell outside the scope of *Halbo's* work he still has given a short survey of the course of the affection in the cases examined, though without giving the observation period.

The prognosis of posttraumatic dystrophy of the extremities seems rather uncertain. In particular, data are lacking as to whether the condition may improve after discontinuation of the treatment. In this preliminary report, therefore, I have aimed to collect dystrophy material in which the dystrophy was well developed in the individual cases, and the treatment was commenced at a relatively early stage in the development of the disease. My plan was, further, to follow the course of the individual cases after the discontinuation of the treatment for as long as possible—in order to be able to assess the final result. For it seemed possible, indeed, that in the course of years the reparative processes of the organism would be able somehow to remedy the consequences that are known to manifest themselves after the healing stage apparently has ceased.

The present material comprises 24 patients with 25 instances of post-traumatic dystrophy of the extremities, most of the with a severe degree of the affection in the developmental stage.

10 cases were diagnosed 3-9 weeks after the accident,

11 " " " 10-14 " " " " "

4 " " " 20-29 " " " " "

For the clinical working-up of this material I have characterized the severity of the dystrophy according to the degree to which it has disabled the part involved. Thus

1/1 disability means complete loss of function owing to the dystrophy;
the dystrophy;

0 " " no loss of function.

Between these two extremes I have assessed the degree of dystrophy by recording the disability in fractions: $\frac{1}{4}$ — $\frac{1}{2}$ — $\frac{3}{4}$. Of course, this is a very rough way of classifying the material, but it is serviceable in practice and it permits us in our judgement of a case to exclude the disability resulting directly from the accident—*e.g.*, faulty position of a future.

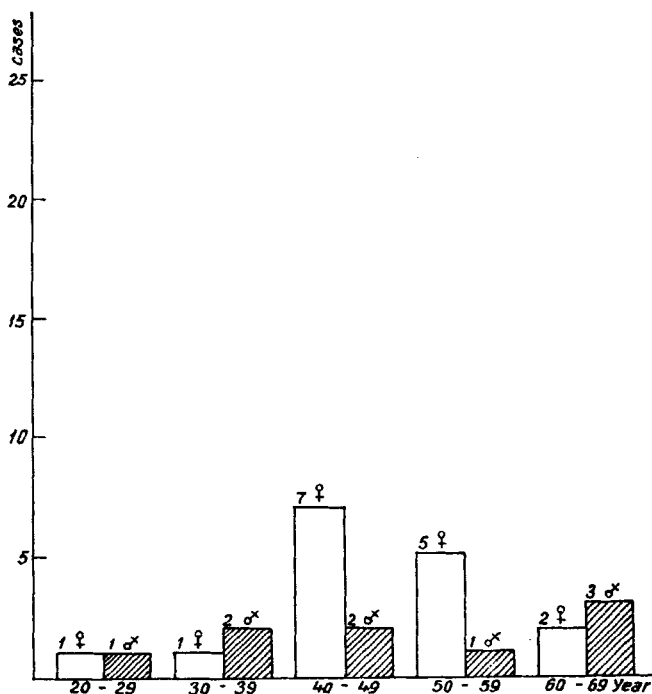


Fig. 1.

Posttraumatic extremital dystrophy in 25 cases.
Distribution of the cases according to sex and age.

In these 24 cases there are 25 instances of dystrophy because in one patient we have been able to follow the development of the dystrophy in the right shoulder and the left corpus following injuries which we treated from the first hour. An abstract of the case history of this patient will be given below, as it almost might be taken as an example of a dystrophy produced experimentally.

Fig. 1 shows the age and sex distribution of the present material. In keeping with the findings reported by other authors, a majority of the

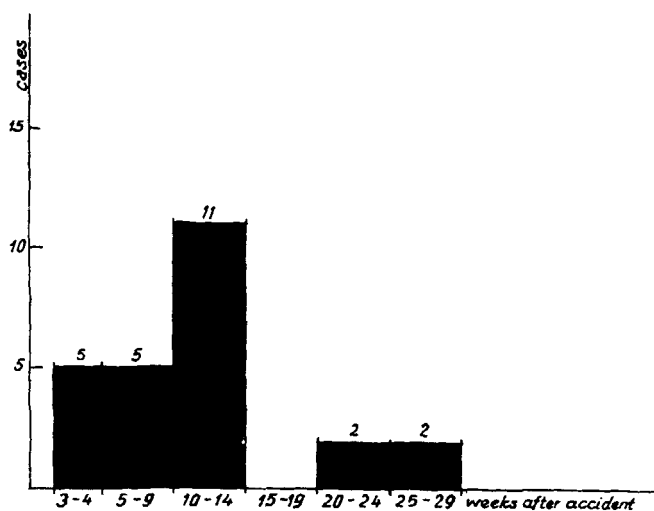


Fig. 2.

Diagnosis of dystrophy and commencement of treatment.
in weeks after the injury.

cases is found in the age group of 40-60 years, and is made up preponderantly of women.

Fig. 2 shows when the dystrophy was diagnosed and its treatment begun in relation to the day of the accident.

The duration of the treatment, in weeks, is presented graphically in Fig. 3. Those patients who were under treatment for a considerable length of time, 16-50 weeks, were not constantly under active treatment: there have been long periods of rest, and periods of exercise.

The final disability at the conclusion of treatment is illustrated in Figs. 4 and 5. Here the material is divided into two groups, depending on whether the observation period after the treatment has been 8-12 or 24-95 months:

Observation period	No. of cases
8-9 months	4
10-12 ..	3
24-35 ..	11
36-47 ..	4
60-71 ..	1
72-83 ..	0
84-95 ..	2

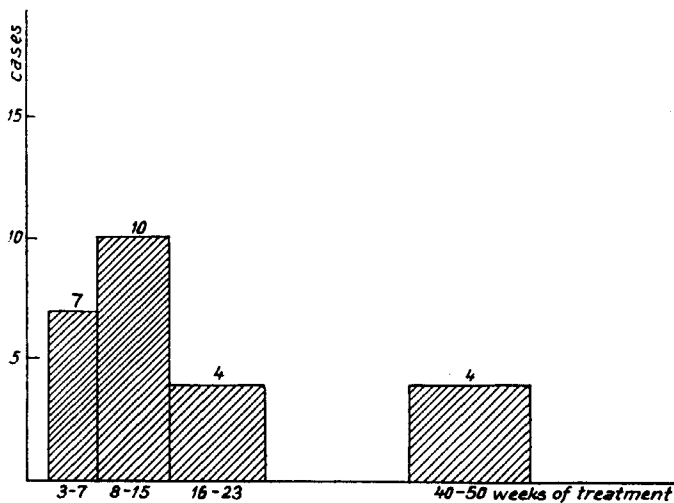


Fig. 3.

Period of treatment in numbers of cases.

In Figs. 4 and 5 each column signifies 1 patient. The height of the column gives, in fractions, the degree of invalidity. The columns giving the condition of the individual patient after the discontinuation of the treatment tell, in figures, the interval between the discontinuation of treatment and the assessment of the disability of the respective patients.

The small number of cases allows of no statistical analysis. Still, it seems justifiable to claim that after a severe degree of dystrophy the prognosis is poor. Of the 22 cases 11 will continue to be markedly disabled; only 5 patients recovered completely and permanently. The remaining 6 patients were disabled in some degree.

This material offers no evidence in favor of the view that a long observation period gives better final results. The material includes only 3 patients with moderate dystrophy, and 2 of them recovered completely while one was still disabled by pain and organic joint changes as long as 31 months after the discontinuation of treatment. The apparently better prognosis in the cases of moderate dystrophy is also met with in Haldbo's material.

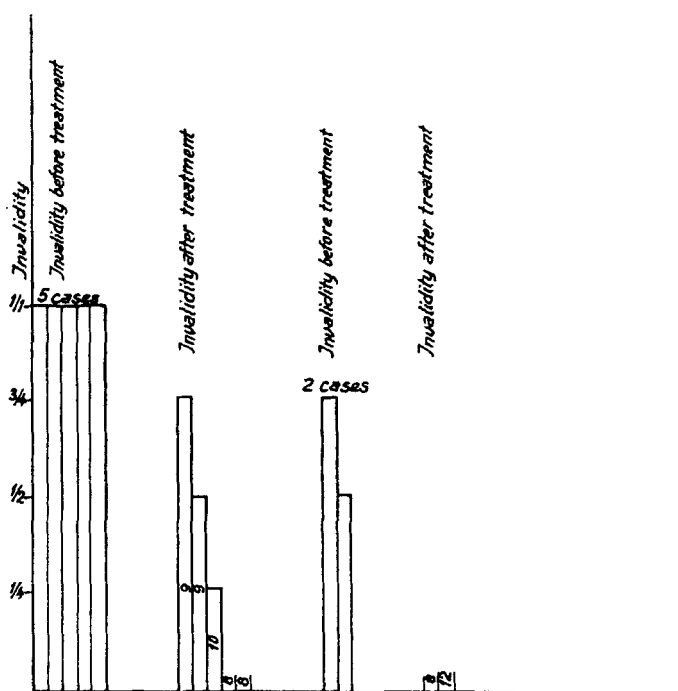


Fig. 4.

Assessment of invalidity (7 cases) before, and 8-12 months after, treatment.

The invalidity is expressed in the fractions mentioned. The point of time for the final estimation of the invalidity is given in months after institution of treatment. The width of the columns gives the number of cases in the respective category.

In Table 1 is given a summary of, the type of injury, the primary treatment, and our treatment of the resulting dystrophy.

Unfortunately this material is not so large and uniform that it is possible in this way to elucidate which method of treatment is preferable, the conservative or the active. It should be mentioned that sympathetic blocks have been used repeatedly in 18 of our patients; and it is our impression that the immediate effect of such blocks is very good, but that the func-

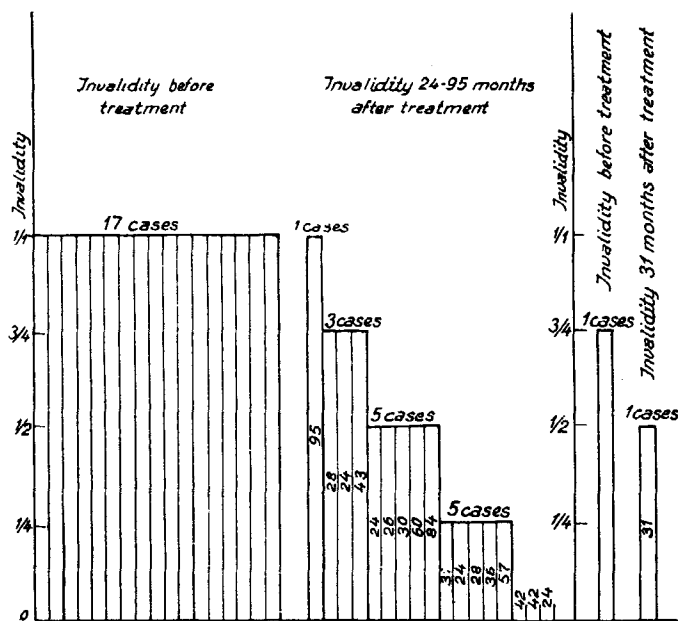


Fig. 5.

Estimation of invalidity (18 cases) before and after 24-95 months. The degree of invalidity is recorded in fractions. The point of time for the final estimation of invalidity is recorded in months after the beginning of the treatment. The width of the columns indicates the number of cases.

tional improvement obtained subsides in 1-2 weeks, after which the condition is only a little better although does not return quite to the initial stage. Therefore, it is essential to do a series of sympathetic blocks.

It appears as if blocking of the sympathetic system by X-ray has in a few cases been satisfactory, especially nalgetic, and thus improved the trophic condition.

Sympathectomy has proved a failure in the present material. Here, however, it has to be taken into consideration that the treatment with sympathectomy was performed only in very severe or relatively old cases. And it should be emphasized that our present experiences are far more favorable.

In the relatively mild cases, conservative treatment—if neces-

sary—combined with blocking—is a good procedure, leading to a permanently good result. In these cases, too, the sedative treatment of the central nervous system appears to be of not inconsiderable significance, whether this be pharmacological or suggestive.

An analysis of the material with a view to the relation between the quality of the traumatic injury and the posttraumatic dystrophy has not been possible. Still, it may be mentioned that in about one-half of our cases the dystrophy developed after a fracture that had been treated primarily in some other clinic. In the remaining cases the primary injury consisted of: contusion (6 (cases), lacerations (2), gunshot wounds (3), operation for Dupuytren's contracture (1), and periarthrosis (1).

It is still an open question whether a particularly nervous disposition may especially predispose to posttraumatic dystrophy. Even though it falls outside the scope of this paper, I think, it should be mentioned that the case records were kept with a particular view to this question. Thus, indeed, it is found that 10 out of the present 24 patients may safely be said to have presented evidence of a "nervous constitution" prior to the accident.

The total result of the treatment of these 25 instances of posttraumatic extremital dystrophy is thus: a permanently poor result in 12, a fairly satisfactory result in 6, and a good result in 7. If, on the other hand, we consider the severe cases alone—i.e., 22 cases—we have the following results: 11 poor, 6 fairly satisfactory, and 5 good.

Abstract of Case Record (No. 10-11).

Periarthrosis humero-scapularis dx.—Dystrophia posttraumat.—Fract. radii sin.

The patient was a woman, 57 years old, with a "nervous constitution". After a severe contusion of the right shoulder, periarthrosis developed in the following year increasing gradually in intensity.

Under local novocaine anaesthesia + N_2O-O_2 anaesthesia gentle manipulation of the right shoulder was performed, with application of an abduction splint. Two weeks later, there was pronounced dystrophy of the entire right arm. Treatment with peri-articular injections of novocaine and with sedatives had no effect.

8 weeks after the brisement, blocking of the stellate ganglion was performed—with excellent, though only transitory relief from the pain.

X-ray blocking gave absence of pain for a few weeks and better circulation, but the organic changes in the joints improved very little.

Then treatment with extension, massage and heat was followed by some improvement. After 22 months her condition was stationary, free from pain, but with pronounced trophic skin changes and organic contracture of nearly all the digital joints, as well as rigidity of the shoulder.

At this juncture the patient fell and sustained a Colles' fracture on the left side, which was at once reduced perfectly under novocaine anesthesia. The forearm was immobilized for 6 weeks in a plaster cast, allowing free movements of the fingers throughout this period. In the 8th week after this fracture, dystrophy of the extremity began to threaten. At the same time, *the dystrophy of the right upper extremity was aggravated.*

12 weeks after the fracture, retroganglionar dorsal sympathectomy was performed *ad modum* Smithwick, on May 20, 1942. During the following weeks and months there was a *pronounced improvement in the functional capacity not only of the left arm but also of the right one, especially in the shoulder.* But, owing to rigidity and contractures of the digital joints the result was still a permanent disability of $\frac{1}{2}$.

TABLE 1. *Schematic Summary of*

Pt. No.	Sex	Age	Type of injury Location	Treatment of injury	Disability from dystrophy
1.	M.	24	Fracture of leg.	Wire traction. Infection. 3 months.	1/1
2.	M.	49	Compression of foot.	Plaster cast. 2 months. Massage. 8 months (!).	1/1
3.	F.	50	Fracture of malleolus.	Traction. Plaster cast. Zinc plaster. 3 months.	1/1
4.	F.	60	Fracture of radius.	Splint. Massage. 3 months.	1/1
5.	M.	63	Fracture of calcaneus.	Confinement to bed. 3 months.	1/1
6.	F.	41	Contusion of index finger.	Hot bathing of hand. 3 weeks.	1/1
7.	F.	68	Fracture of humerus.	Abduction splint. Extension. 4 months.	1/1
8.	F.	40			1/1
9.	M.	64	Contusion of hand.	X-ray treatment. Diathermy. Massage.	1/1
10.	F.	57	Humeroscapular periarthrosis.	Procaine anesthesia. Manipulation. Abduction.	1/1
11.	F.	57	Fracture of radius.	Reduction under procaine anesthesia. Plaster cast. 6 weeks.	1/1

the Present Material.

Treatment of dystrophy	Final disability	Remarks
Immobilization.		8 years after injury: Amputation.
Lumbar sympathetic block.		
Lumbar sympathectomy, with transitory favorable effect	1/1	
Lumbar sympathetic block.		9 months later he says he is much better.
Lumbar sympathectomy.	3/4	Reexamination impossible. (Gone to Germany.)
Lumbar sympathetic block.		Stellate block.
Zinc plaster.	3/4	Treatment of contracture. 3/4
Stellate block.		
Treatment of contracture.	3/4	
Plaster cast.		
Lumbar sympathetic block.	3/4	
Plaster cast. 4 weeks.	1/2	
Periarticular procaine.		Treatment not carried completed.
Stellate block.	1/2	
Stellate block.		
Treatment of contracture.	1/2	
Stellate block.		
Exercise.	1/2	
Immobilization.		
Stellate block.		
X-ray treatment.	1/2	
Stellate block.		
Dorsal sympathectomy (Smithwick).	1/2	

TABLE 1

Pt. No.	Sex	Age	Type of injury Location	Treatment of injury	Disability from dystrophy
12.	F.	57	Fracture of elbow.	Plaster cast. Massage. 5 months.	1/1
13.	F.	46	Fracture of humerus.	Plaster cast. Exercise. 6 weeks.	1/1
14.	M.	57	Operation for Dupuytren's contracture.	Massage. Heat. 5 months.	1/1
15.	F.	43	Fracture of leg. Consolidation delayed.	Plaster cast. Inforation. 7 months.	1/1
16.	F.	31	Compression of fingers.	Plaster cast. Massage 4 weeks.	1/1
17.	F.	45	Squeezing of 3rd finger.		1/1
18.	F.	44	Fracture of leg.	Wire extension. Plaster cast. 4 months.	1/1
19.	F.	52	Fracture of radius.	Repeated reductions. Plaster cast. Massage. 10 weeks.	1/1
20.	M.	32	Fracture of metatarsus.	Plaster cast. 6 weeks. Massage.	1/1
21.	F.	47	Gunshot wound of elbow. Injury to the nerve.	Plaster cast. Massage. 4 weeks.	1/1

(cont.)

Treatment of dystrophy	Final disability	Remarks
Stellate block. Periarticular procaine. Exercise.	< 1/4	
Abduction splint. Exercise.	< 1/4	
Stellate block. (6 times).	1/4	
Lumbar sympathetic block. (3 times).	1/4	Patient refuses sympathectomy.
Stellate block. X-ray treatment. Occupational therapy.	1/4	
Procaine conduction anesthesia; Stellate block. Periarterial sympathectomy. Treatment for contracture.	1/4	2nd day: Severe vegetative disturbances. After 8 weeks pronounced dystrophy.
Walking plaster for 8 weeks. Zinc plaster for 4 weeks.	0	
Stellate block. (6 times).	0	
Walking plaster for 8 weeks.	0	
Stellate block. (6 times). X-ray treatment.	0	After 4 weeks, severe pain.

TABLE 1

Pt. No.	Sex	Age	Type of injury Location	Treatment of injury	Disability from dystrophy
22.	M.	33	Contusion of foot.		1/1
23.	F.	21	Gunshot wound of fingers.	Bandage. 18 days.	3/4
24.	M.	66	Gunshot wound of foot. Metatarsal fractures.	Plaster cast. 2 months.	3/4
25.	M.	43	Gushot wound in popliteae region. Paralysis of <i>tibial</i> nerve.	Wound treatment.	1/2

DISCUSSION—CONCLUSION

Without stating the minimum observation period, *Haldbo* says that in his cases the outcome of posttraumatic dystrophy of the extremities was found to be as follows:

Among 14 mild cases: Good in 13; fair in 1.

„ 14 moderate „ : „ „ 7; „ „ 4; poor in 3.

„ 6 severe „ : „ „ 1; „ „ 2; „ „ 3.

Thus there is good agreement between *Haldbo's* material and my own material of 22 severe cases of posttraumatic extremital dystrophy, one-half of which were still in a poor condition.

So, I think, it will be justifiable to claim that in severe cases the prognosis of posttraumatic extremital dystrophy is very serious when the treatment has been conducted according to the principles mentioned. As for some length of time we have realized that the decisive factor for the final disability is to avoid the

(cont.)

Treatment of dystrophy	Final disability	Remarks
Lumbar sympathetic block. (3 times).		After 8 weeks, dystrophy.
Walking plaster cast.	0	
Procaine nerve block.		Contracture of reflex. Dystrophy.
Walking plaster cast.	1/2	
Zinc bandage.	0	

severe organic changes in the joints—especially fibrous capsular shrinkage—we have aimed at a more active therapy.

We are watching out for commencing dystrophy, which in many cases begins indeed in the form of slight reflex changes turning into a more serious form, in spite of conservative treatment. It is at this stage that active therapy should begin, and I think that later I shall be able to demonstrate that, it at this early juncture we institute an effective and lasting blocking of the sympathetic system, the functional result in cases of this kind will improve considerably.

It would be quite justifiable to ask us why we did not take this stand from the very start. The explanation is simply this: that in the beginning the complaints and symptoms are so moderate that it might seem unreasonable to institute any active treatment. Not only the patient, but also his private physician, would hardly be able to understand our preference for active treatment. Now, however, after the poor prognosis has

been established with certainty, our stand is much stronger when we recommend an early active therapy in preference to an expectant conservative treatment.

SUMMARY

1. Altogether 22 instances of severe posttraumatic dystrophy of the extremities, chiefly under conservative treatment—immobilization, sympathetic blocking, etc.—and with an observation period of 24-95 months after the conclusion of the treatment, showed no particular improvement after the discontinuation of the treatment.

2. In the severe cases of dystrophy the prognosis is poor. Out of 22 patients, 11 were permanently severely disabled, while in 6 the result was fairly satisfactory, and in 5 only was it quite good.

3. It is recommended to institute an active therapy with protracted, possibly permanent, sympathetis blocking, at an early juncture of the dystrophy.

ZUSAMMENFASSUNG

1. Insgesamt 22 Fälle von schwerer posttraumatischer Extremitätendystrophie, in der Hauptsache mit konservativer Behandlung — Immobilisierung, Sympathikusblockade usw.—und mit einer Observationszeit von 24—95 Monaten nach der Behandlung, zeigten nach Beendigung der Behandlung keine besondere Besserung.

2. In den schweren Fällen von Dystrophie ist die Prognose schlecht. Von 22 Patienten waren 11 dauernd schwer invalidisiert, während das Ergebnis bei 6 recht befriedigend und nur bei 5 wirklich gut war.

3. Es wird empfohlen, in einem frühen Stadium der Dystrophie eine aktive Therapie einzuleiten mit protrahierter, nach Möglichkeit permanenter Sympathikusblockade.

RÉSUMÉ

1. Au total 22 cas de dystrophie post-traumatique des extrémités, soignés avec immobilisation, blocage des ganglions sympathiques, etc.; pas d'amélioration sensible à la fin du traitement. — Période d'observation d'une durée de 24 à 95 mois après cessation du traitement.

2. Le pronostic est mauvais quand il s'agit de cas graves de dystrophie : 11 des 22 malades ont gardé une incapacité permanente partielle d'un pourcentage élevé, 6 ont obtenu un résultat à peu près satisfaisant, dans 5 cas seulement le résultat a été tout-a-fait-bon.

3. Nous recommandons une thérapie active dès le début de la dystrophie : blocage prolongé, ou permanent si possible, des ganglions sympathiques.