

RESULTS OF THE TREATMENT OF POSTTRAUMATIC REFLEX SYMPATHETIC DYSTROPHY OF THE UPPER EXTREMITY WITH REGIONAL INTRAVENOUS BLOCKS OF METHYLPREDNISOLONE AND LIDOCAINE

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The results of the treatment of 36 patients with post-traumatic reflex sympathetic dystrophy of the upper extremity with regional intravenous blocks of methylprednisolone and lidocaine are presented. The extremity is exsanguinated and a tourniquet is applied. A solution of methylprednisolone, lidocaine and heparin is injected. The duration of the block is 20-25 minutes. After the limb is anesthetized the affected joints can be manipulated in a progressive, controlled fashion. With a 1-year follow-up the response to treatment in 25 patients (69%) was considered as good (relief of spontaneous pain, no limitation in finger movement), in 8 as moderate (22%) and in 3 as poor (9% — the symptoms were unaltered or worse). Physiotherapy was applied in all patients (program of finger exercises, whirlpool therapy). Complications in 2 cases were transient superficial thrombophlebitis of the forearm ; in 2 other patients the block was interrupted because of severe pain in the limb. We found this method simple, easy to perform, safe and inexpensive ; the results are comparable to other established methods of the treatment i.e. sympathetic blocks or calcitonin.

Keywords : reflex sympathetic dystrophy ; regional intravenous blocks.

Mots-clés : algodystrophie réflexe sympathique ; blocs régionaux intraveineux.

The treatment of reflex sympathetic dystrophy (RSD) includes procedures such as sympathetic ganglia blocks, regional intravenous sympathetic blocks, sympathectomy and fasciotomy (3, 5, 6, 7). Several drugs have been used including cal-

citonin, corticosteroids, beta-blockers, phenoxybenzamine, nifedipine and free radical scavengers (2, 3, 5, 8, 12). Over the past 20 years numerous reports have appeared on the efficacy of systemic corticosteroids in this condition, but they also had side effects and were not without morbidity (4, 9, 10). Hannington-Kiff (6) first reported in 1977 the technique of regional intravenous guanethidine for the treatment of RSD, and since then its use has been widely accepted. Regional intravenous steroid (methylprednisolone) with lidocaine (RIM-L) was introduced by Poplawski *et al.* in 1983 (9).

TECHNIQUE

A small catheter is inserted into a superficial vein on the dorsal side of the affected hand or wrist. The extremity is then exsanguinated and the pneumatic tourniquet is placed on the arm and inflated. A solution consisting of 80 mg of methylprednisolone (Solu-Medrol, Upjohn), 20 ml of 1% lidocaine and 1000 I.U. of heparin is then injected slowly through the catheter. The duration of the block is 20 to 25 minutes. After the limb is anesthetized the affected joints are manipulated in a progressive, controlled fashion.

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MATERIAL AND METHODS

This study included 36 patients with RSD. The diagnosis was established based on clinical examination and 3-phase bone scan ; presence of the typical features of the condition, namely diffuse pain of the hand, swelling, tenderness, vasomotor instability and stiffness was essential for the diagnosis. There were 23 women (64%) and 13 men (36%) aged from 44 to 73 years (average 54 years) ; distal radius fracture was the cause of RSD in 22 patients (61%), fasciectomy (Dupuytren contracture) in 5 (14%) and other hand injuries (fractures of metacarpal bones, tendons and nerves injuries) in 9 (25%). Duration of the disease was 1 to 3 months in 27 cases (75%), 4 to 6 months in 7 (19%), and 8 months in the remaining two (6%). According to Steinbrocker's classification 27 patients (75%) were in stage I, 8 (22%) in stage II, and one in stage II/III of the disease. Fully developed RSD was diagnosed in 25 cases (69%) and mild (poor symptomatic) in 11 (31%). A RIM-L procedure was the first treatment in 30 patients (83%), and in 6 (17%) other methods were applied earlier with poor response (calcitonin in 4 and operative treatment in 2). Three blocks were performed in 2-days intervals (in two cases, two blocks were performed because of thrombophlebitis). All patients received conventional physical therapy (program of finger exercises and whirlpool) during treatment and for the next 4 weeks. Early response to the treatment was evaluated shortly after the last block. Late results were assessed at 12 months from the onset of the treatment. The overall late results were graded according to the following criteria : good — little or no pain and

full range of motion ; moderate — persistent pain under loading or loss of finger flexion of less than 3 cm ; poor — persistent spontaneous pain or loss of finger flexion of more than 3 cm.

RESULTS

Early Response. The study started with 40 patients. Two to three days after the last block, significant relief of pain was noted by 18 patients (42,5%) ; 20 (50%) felt no difference in pain intensity and in one female patient complaints were exacerbated ; the remaining two (who were withdrawn from the study) felt severe pain in the limb during the first procedure and declined further such treatment. In all but one patient full passive finger flexion was possible during the last block. No exacerbation of the condition was observed in spite of manipulation of the affected joints.

Late Results. Twelve months from the onset of the treatment, 36 patients were available for assessment ; disappearance of the symptoms of RSD is shown in table I. Of 3 patients with persisting severe pain in the hand, the features of median nerve compression were found in 2 and entrapment of a small cutaneous nerve in one ; all 3 were operated with a satisfactory response in only one case. Of 16 patients complaining of severe spontaneous pain at entry into the study, only 4 were completely free of pain at one-year follow-up ; 2 patients complained of moderate

Table I. — Resolution of the features of reflex sympathetic dystrophy in 12 months' follow-up

Feature		Number of patients	Resolved	Persisted
Pain	severe	19	16 (84%)	3 (16%)
	moderate	17	14 (82%)	3 (18%)
Swelling		34	32 (94%)	2 (6%)
Discoloration		30	28 (93%)	2 (7%)
Temperature changes		35	28 (80%)	7 (20%)
Hyperidrosis		24	21 (87%)	3 (13%)
Loss of finger flexion	1-3 cm	16	16	0
	4-6 cm	10	9 (90%)	1 (10%)
	> 6 cm	10	9 (90%)	1 (10%)

pain after loading of the limb and the other 10 of occasional pain, particularly with changes in the weather. Of 17 patients complaining of moderate spontaneous pain at entry into the study, 2 were completely free of pain, 12 felt occasional pain with weather changes and in 3, symptoms were unaltered. Significant improvement in recovery of range of motion was noted: all but two patients obtained full finger flexion. This benefit was not observed in grip-strength improvement; in only 4 patients were grip-strength ratios (affected to unaffected side) above 50%, in 9 they were between 10% and 50%, and in 23 they were below 10%. These findings suggest persistence of disability which the patients experience in spite of recovery of full finger flexion.

According to the criteria of assessment described above, response to treatment in 25 patients (69%) was considered as good, in 8 as moderate (22%) and in 3 (9%) as poor. From 25 patients with good response, 22 (88%) were in stage I and 3 in stage II of the disease at study entry. From 8 patients with moderate response 4 were in stage I and 4 in stage II. Of 3 nonresponders one was in stage I, one in stage II, and one in stage II/III. In 11 patients with poor or moderate response, persistent pain complaints were the cause in 9 cases (82%) and stiffness in only 2 (8%). These results indicate that RIM-L blocks give more functional than analgesic benefit in the treatment of RSD. Superficial thrombophlebitis of the forearm was observed in two patients (5.5%), in both after the second procedure. The symptoms resolved after 2 weeks of standard treatment, and the late response in both cases was good. No other complications or side effects of corticotherapy were observed during the study.

DISCUSSION

Poplawski *et al.* reported a procedure of regional intravenous methylprednisolone and lidocaine for the treatment of RSD. Twenty-seven patients received 2 to 5 blocks and physiotherapy (active and passive mobilization of each joint, paraffin baths and dynamic splints); the results according to the scale used in this paper were as follows: good results (no pain and full range of motion) were

obtained in 11 cases (41%), moderate in 9 (33%) and poor (no response to treatment) in 7 (26%). Duration of the disease in all nonresponders was 9 months or longer. Poplawski *et al.* noted that response to the treatment is significantly better when administered within 6 months of development of RSD; most patients in late stages of the disorder failed to improve (9). They observed superficial thrombophlebitis in 3, superficial infections in 2 and a severe systemic reaction to lidocaine in one patient (9). Tountas and Noguchi presented the results of RIM-L in 17 patients with RSD of the upper and lower limb (duration of symptoms from 2 days to 6 months; distal radius fracture, present in 59%, was the most frequent predisposing event). All patients received 1 to 4 blocks at weekly intervals and physical therapy; during each block controlled manipulations of all affected joints were performed. After 6 months' follow-up the response in 11 patients was considered satisfactory; after 1 to 4 years' follow-up (15 patients) the results were good in 9 (60%), moderate in 2 (13.3%) and poor in 4 (26.7%). No complications or side effects were observed (13). The results reported in the present study are comparable to the results presented above. The comparison to the results obtained in other series performed in our department shows a slightly higher percentage of satisfactory responses after RIM-L blocks (table II), but differences are not significant.

The lack of a control group is the essential weakness of the present study as well as of the studies of Poplawski and Tountas. In that study it is not possible to distinguish whether satisfactory outcome results from the treatment or from spontaneous recovery. Bickerstaff and Kanis in the paper concerning the natural history of RSD after distal radius fracture conclude that the condition often resolves spontaneously; they emphasize that "rapid rate of resolution of symptoms has important implications for the treatment of RSD in that early recovery may wrongly be attributed to the treatment" (1, 2). Rammamurthy *et al.* described tourniquet-induced analgesia, but this effect was rather transient in nature (10). Some authors point out the role of placebo effects in the treatment of RSD (14). On the other hand, relief of pain

Table II. — Comparison of the efficacy of all methods of treatment performed in the department

Method of treatment	Number of patients	Good response	Percent
Regional M-L blocks	36	25	69%
Mannitol I.V.	32	21	65%
Program of exercises	24	15	62%
Calcitonin I.M.	20	12	60%
All	112	73	65%

observed after regional lidocaine or saline blocks is not long lasting, and complaints recur soon (7). Nevertheless in therapeutic trials of efficacy the study should be adequately controlled in order to diminish the potential influence of the factors mentioned on the final outcome. Significant improvement of range of motion obtained in this series seems to be the result of controlled release of contractures performed during the block ; it is particularly beneficial in cases with predominant stiffness.

Severe swelling observed in early cases of RSD may cause difficulty in inserting a catheter into a vein ; this problem presented in 4 patients in the present study. Continuous elevation of the affected limb in an abduction splint was maintained for a week with satisfactory results (reduction of the swelling and adequate approach to the vein).

Superficial thrombophlebitis that occurred in two patients had no significant influence on the final outcome ; we believe that adding 1000 I.U. heparin to the solution decreases the risk of thrombophlebitis after regional intravenous procedures.

Sixteen patients (44.5%) from this series were treated on an inpatient and 20 (55.5%) on an outpatient basis. Ambulatory patients were observed in hospital for about 1 hour and then discharged.

The mechanism of steroid action in RSD remains unclear. The suggested mode of action is stabilization of endothelial cell membranes (decreasing capillary permeability), stabilization of nociceptor and nerve ending membranes (reducing noxious stimuli and thus pain) and reduction of discharge of vaso- and neuroactive peptides such

as bradykinin, prostaglandins, substance P, and endothelial-derived relaxing factor as well as free radicals in the area of the disease (4, 8, 9, 13).

CONCLUSIONS

The present study shows that regional intravenous methylprednisolone with lidocaine followed by physiotherapy is a simple, safe, effective and inexpensive procedure for the treatment of RSD and may provide an alternative to other established methods such as sympathetic blocks and calcitonin. It may be applied in early dystrophies as well as in later stages, particularly with predominant, refractory finger stiffness. We did not find particular advantages of this procedure over the others performed in the department such as intravenous mannitol, physiotherapy (system of exercises) and calcitonin.

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SAMENVATTING

A. ZYLUK. *Behandelingsresultaten van posttraumatische Reflex Sympatische Dystrofie van het bovenste lidmaat door regionale intraveneuze blocks met prednisolone en lignocaine.*

De behandeling van RSD met regionale blocks werd bij 36 patiënten nagekeken. De blocks bestonden uit een oplossing met prednisolone, lignocaine en heparine en werden na exsanguinatie gedurende 20 tot 25 minuten toegepast. Tijdens de anesthesiefase werden de getroffen

gewrichten gemanipuleerd. Het resultaat na één jaar was goed bij 25 patiënten (69%), matig bij 8 en slecht bij 3 (symptomen onveranderd of slechter). Alle patiënten kregen eveneens fysiotherapie.

Complicaties waren weinig frequent : tweemaal een oppervlakkige tromboflebitis van voorbijgaande aard, tweemaal diende de block te worden onderbroken door onhoudbare pijn. Deze methode is eenvoudig, gemakkelijk, veilig en relatief goedkoop. De resultaten zijn vergelijkbaar met andere modaliteiten (sympaticus infiltraties en calcitonine).

RÉSUMÉ

A. ZYLUK. *Traitement de l'algodystrophie réflexe sympathique du membre supérieur par blocs régionaux de méthylprednisolone et de lidocaïne.*

Les résultats du traitement de 36 patients présentant une algodystrophie réflexe sympathique post-traumatique du membre supérieur à l'aide de blocs régionaux intraveineux de méthylprednisolone et de lidocaïne sont présentés. Le membre est exsanguiné et un garrot est mis en place. La solution de méthylprednisolone, lidocaïne et héparine est injectée. La durée du bloc est de 20 à 25 minutes. Pendant que le membre est ainsi anesthésié, les articulations atteintes sont manipulées de manière progressive et contrôlée. A un an, un bon résultat (disparition de la douleur spontanée, récupération de mobilités digitales normales) a été obtenu chez 25 patients (69%), un résultat moyen chez 8 patients (22%) et un résultat médiocre chez 3 patients (9%) avec persistance ou aggravation de la symptomatologie. Tous les patients ont bénéficié en outre de kinésithérapie adaptée (programme de mobilisation des doigts, whirlpool). Les complications observées furent 2 phlébites superficielles transitoires de l'avant-bras ; chez 2 autres patients le traitement fut interrompu en raison de douleurs sévères. La technique est simple, de réalisation facile, sûre et bon marché ; les résultats sont comparables à ceux obtenus après les méthodes conventionnelles, notamment les blocs sympathiques ou la calcitonine.