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ON SYMPATHECTOMY IN DISTURBANCES OF THE BLOOD CIRCULATION AFTER INFANTILE PARALYSIS

By

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Vegetative-nervous disturbances in the acute phase of infantile paralysis, such as Horner's syndrome, retention or incontinence of urine, angiospasms or–paresis in the skin, show that the automatic nervous system has been damaged as well. This was alluded to by Wickman as early as 1907 and Ed. Müller in 1910. Some of these symptoms heal completely. Vasospastic disturbances are, on the other hand, often found in the paralysed extremities after the acute phase. Patients then have a sensation of cold in their feet and legs and their feet are cold even in room temperature. In the morning the feet are warm, often bright red in colour, in the evening again cyanotic, cold, moist and swollen. When the patient goes to bed it takes a long time before his feet get warm. The process of becoming warm is now and then accompanied by a burning pain which disturbs sleep. The symptoms become worse in the winter; the patients often have chilblains and ulcerations in their legs and between the toes. Incisions in the ankle and the foot tend to heal slowly and there is often necrotic development in the edges.

Changes in the crescents of the spinal cord have been found pathoanatomically (Fanconi, E. Smith et al.). According to Fanconi, the fact that vasomotor and trophic disturbances, after motorial paralysis, usually develop slowly, points to a secondary degeneration of the vegetative fibers. The vegetative disturbance is usually most severe in those cases in which the motorial paralysis is most complete and irreparable.

Not until recent years has attention been paid to the removal of the additional trouble caused to patients with infantile paralysis by

the vegetative disturbances. Because one has to deal with a vasospastic condition the idea of correcting it by surgery on the sympathicus naturally presents itself first. The primary results of lumbar sympathectomy have been good in every case (Haxton, Stenport). On the other hand, there is very little information about the permanence of its effect. *Leriche* mentions two sympathectomies which he carried out because of infantile paralysis, one of which showed a good result for 11½ years and the other for two years after the operation.

The short duration of the effect is a common drawback of sympathectomy. *Kallio* found that in conditions of phantom pain the effect of sympathectomy disappeared totally in most cases after 1–4 years. *Löfgren* noted that after sympathectomy the anhidrotic area decreases with time, beginning from the proximal part of the extremity. Yet after 2–3 years there was continuous lack of perspiration in the periphery of the extremity as well as on the outer side of the leg in general. According to *Löfgren* it is a matter of partial regeneration of the activity of the sympathicus.

Forty-seven lumbar sympathectomies were performed in the Hospital of the Invalid Foundation in the years 1946–49 because of disturbances, due to infantile paralysis, in the blood circulation of the lower extremities. In all these cases the distal parts of the extremities were paralysed most severely. The motorial paralysis was slight in only one of the cases. The time of observation was over two years in 28 cases, in 19 cases from 1 to 2 years. Fourteen of the patients were men and 29 women, which is additional evidence of the greater vasolability of women compared with men. The average age of the patients at operation was 26 years, the youngest being 10 and the oldest 51 years. The time that had elapsed since the patients developed the disease was 2 years in 6 cases, from 3 to 10 years in 16 and over 10 years in 21 cases. Eleven patients had undergone various operative measures before the sympathectomy, the rest had received conservative treatment or had not been treated at all.

In the follow-up we paid attention to the subjective feeling of cold, the colour and the temperature of the skin, swelling and ulcerations and made a perspiration test besides (Rieder and Neumann). The lower extremities were smeared with ferrotannin paste (Ferros. sulph. sicc. pulv. subt., Talc. aa 20.0, Ol. arach., Aether, Spir. fort. aa ad 100.0) and were placed under a thermoregulator for 30 minutes. The perspiring area soon became black. The anhidrotic area usually comprised the foot and the lower part of the leg exclusive of the medial side. Some perspiration could occur in spots there too, but there was a

distinct difference compared with the unoperated extremity in the successful cases. The result of the perspiration test was in conformity with the patient's subjective opinion. Only in one case was there perspiration although the patient said he had no trouble.

The primary result was good for all the patients. After the operation the foot was dry and warm, the cyanosis and the ulcerations disappeared, the tendency to swelling diminished. The condition deteriorated during the period of observation almost to its former level in four cases, in one as soon as one year and in three cases in two years after the operation. In all other cases the condition has remained good continuously, so that until the present the good result has persisted for over 2 years in 24 cases at least.

In the cases which deteriorated the metatarsus and the sole of the side operated on perspired as strongly as the side not operated. All the patients were women, from 16 to 38 years old, and from 2 to 27 years had elapsed since the paralysis. In one case the ganglions L II–IV had been removed, in the others the two lowest lumbar ganglions. In all four cases the foot was quite immobile. Since the blood vessels and sweat glands thus functioned in quite unphysiological circumstances for years, it may be possible that we have to deal with gradually developed gland automatism besides the sympathicus regeneration. In Löfgren's cases of thromboangitis the anhidrosis had persisted in the foot at least, in spite of the exacerbated condition which led to amputation.

It seems as if in infantile paralysis which is not a progressive blood vessel disease even a slight remaining sympathicus denervation, characterized by anhidrosis restricting itself to the foot only, would suffice to maintain a tolerably good condition.

We paid attention, besides, to the effect of sympathectomy as a factor preventing edge necrosis and the wound infections resulting from it, which are not uncommon in foot operations. Before sympathectomy eleven such operations had been performed, of which three were followed by edge necrosis and infection. Out of 28 operations performed after sympathectomy, only one was followed by necrosis. In this case arthrodesis had been performed contemporaneously with sympathectomy. Apparently it would be advisable not to perform the foot operations until some time after the sympathectomy when the nutrition of the extremity has improved.

As an additional observation, we noted in 22 cases improvement in the motion of the lower extremities on the side operated upon, which may simply be due to the increased blood supply to the remaining muscles.

With two exceptions the surgery performed was a low sympathectomy, removing 1–3 lowest lumbar ganglions. According to *Poppen* it is the removal of the L IV ganglion that causes the perspiration to disappear in the foot.

In our material the result is not very much dependent on the extent of the sympathectomy. The highest rise in temperature, 14.4°C, was achieved in a case in which only part of the sympathicus trunk was removed without finding any ganglion. In this case the result remained very good as late as three years after operation. In a relapse the ganglions L II–IV were removed with an effect lasting only two years.

According to our investigation the disturbance of the blood circulation in the lower extremities after infantile paralysis is to be regarded as one of the best indications for sympathectomy. By low sympathectomy a relief in symptoms, enduring over two years at least, is obtained in most cases. The possibility of relapse, however, should be taken into consideration. Even in those cases in which the symptoms return as early as within 1–2 years, necessary corrective operations to help the patient towards recovery may be made with greater safety than without sympathectomy.

SUMMARY

Forty-seven cases have been described, in which lumbar sympathectomy was performed owing to disturbance of the blood circulation in the lower extremities, caused by infantile paralysis. The primary result was good throughout. The time of observation was over 2 years in 28 cases and in 19 cases 1 to 2 years. The condition deteriorated, within the time of observation, approximately to what it was before, in 4 cases, so that in 24 cases it remained good for over 2 years. This shows that disturbance of the blood circulation in the lower extremities is one of the best indications for sympathectomy.

RESUME

47 cas ont été décrits chez lesquels on avait procédé à une sympathectomy lombaire par suite de troubles de circulation sanguine dans les extrémités inférieures causées par la paralysie infantile. Le résultat primaire a été entièrement bon. La durée de l'observation a été de plus de deux ans dans 28 cas et, dans 19 cas, d'un à deux ans. Pendant la période d'observation, l'état était revenu à peu près à ce qu'il était antérieurement dans 4 cas, de sorte que le résultat est resté

satisfaisant dans 24 cas pendant plus de 2 ans. Ceci montre que les troubles de circulation sanguine dans les extrémités inférieures est l'une des meilleures indications de la sympathectomie.

ZUSAMMENFASSUNG

Es sind 47 Fälle angeführt worden, in denen man die Lumbalsympathectomie infolge der von der Kinderlähmung in den unteren Extremitäten verursachten Blutzirkulationsstörung vorgenommen hat. Das primäre Resultat war bei allen gut. Die Beobachtungszeit dauerte in 28 Fällen über 2 Jahre und in 19 Fällen 1–2 Jahre. Der Zustand hatte sich in 4 Fällen während der Beobachtungszeit beinahe wie bei Ausgangsstadium verschlimmert, während der Zustand in 24 Fällen über 2 Jahre hindurch gut geblieben ist. Dies zeigt, dass die Blutzirkulationsstörung in den unteren Extremitäten nach der Kinderlähmung eine der besten Indikationen zum Vornehmen der Sympathectomie ist.

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