PROCEEDINGS OF THE NORTHERN ORTHOPEDIC ASSOCIATION AT ITS 19th MEETING IN STOCKHOLM 8th—9th SEPTEMBER 1938.

The meeting was opened by the chairman, surgeon in chief, *Gustaf Asplund,* Stockholm.

GUSTAF ASPLUND, STOCKHOLM:

MEDICOSOCIAL SURVEY OF SPASTIC CASES IN EUGENIAHEMMET, STOCKHOLM, IN THE PERIOD 1921—1937,

with an Account of the Spastic Material in the Hälsingborg V.F.A. (Asylum for Cripples) in the period 1920—1930.

When here I shall deal with the question of spastic paralysis it is by no means because I think I will be able to make any new contribution to this particularly difficult problem, least of all from an orthopedic point of view. At present, however, the problem of spastic paralysis has attracted a great deal of interest here in Sweden, especially the social aspects of this problem, and I thought therefore it might be of interest to present an account of a fairly large number of spastic cases which I have been able to follow through a number of years, especially as all these patients have been under my treatment during their stay in Eugeniahemmet. As is evident from the title of this paper I have not limited myself to analyse these cases from an orthopedic point of view, but I have extended this investigation to include also a critical estimation of these cases from a social point of view.

This investigation comprises 104 cases, 51 males and 53 females, who have been admitted to Eugeniahemmet within the

period of 1921—1937 for orthopedic treatment, school education and occupational training. About an additional dozen of spastic paralytics have been admitted to this institution within the same period, but only for a relatively short time, whereafter they were discharged on account of very severe mental deficiency, for which reason they have not been included in this account.

It will be appropriate here, I think, in advance to emphasize that the result I have arrived at and the statements I think I am able to make on the basis of my investigation have to be considered on the background of the circumstance, that the present material largely consists of severe cases with very pronounced spasticity, so that it is not quite comparable to the spastic patient material that applies to the clinics and policlinics of the homes for cripples. This is suggested, for one thing, by the relatively few cases of spastic hemiplegia in this account, and also by the severity of the cases in this group, which otherwise are generally more easy to deal with as far as orthopedic treatment is concerned.

For the sake of comparison it had been my intention to give an account also of the spastic cases admitted to various orthopedic hospitals in 1920—1930 so as to obtain in this way a more general and comprehensive survey of the problem concerning spastic paralytics. But these materials have been so large that as yet only the Hälsingborg V.F.A. has been able to conclude this investigation. Dr. Stenport, Chief Physician of that hospital, has been kind enough to place at my disposal the data obtained in the account of his material, which I shall present later on. I hope, however, I shall be able in future to complete my investigation in this respect also as far as the Stockholm V.F.A. and the Gothenburg V.F.A. are concerned.

Among the 104 cases here considered, features of *spastic hemiplegia* were found in 14, *spastic paraplegia* (*Little's disease*) in 45, and *spastic tetraplegia* in 37. In 8 cases there was a *general spasticity* with more or less pronounced athetosis.

At the time of this account 61 of the patients are over 15 years old, 27 are 10—15 years, and 11 under 10 years. 5 of the patients (2 men and 3 women) have died as adults. According

to the information given by the relatives, the spastic condition has been congenital in 91 cases (88.4 %), and acquired within the first years of life in 12 cases (11.5 %). In one case no information could be obtained. In Group IV the spastic condition has been congenital in every case; in Groups II and III it was congenital respectively in 91.1 % and 94.4 %. In Group I, spastic hemiplegia, the disease has been congenital in 57.2 %, and acquired in the first years of life in 42.8 %. In Silfverskiöld's monograph (1924) on spastic hemiplegia this disease was reported as congenital in 33 % of the cases, acquired in 67 %. In 8 cases the birth of the patient is stated to have been troublesome; in 12 cases the patient was born prematurely; and in 5 cases the patient was a twin. In 63 of the cases (60.6 %) the spasticity present on admission was very pronounced, while it was of moderate or slight degree in 41 cases (39.4 %). Complications in the form of athetosis, etc. were found in 29 cases. As mentioned already, the large number of cases with severe spasticity indicates that the present material has been composed to a not inconsiderable extent by particularly severe cases. It is of interest therefore in connection with this reexamination of the patients to investigate also their ability to walk.

From Table 1 it will be noticed that the walking capacity is good or fairly good in 43 cases (41.3 %), slight or poor in 33 cases (31.8 %), and nil in 28 cases (26.9 %). Now, however, it has to be pointed out, that in speaking of a good or fairly good ability to walk in a patient with spastic paraplegia or tetraplegia, our demands in this respect have to be very low. For I hold that in these patients the walking capacity is to be considered fairly good when they are able to get along well or fairly well by means of 1 or 2 canes. This ability is to be estimated in view of its state prior to the treatment. I designate the walking capacity as slight or poor when the patient can move about only by means of crutches. As was to be expected the walking capacity is most impaired in Group III (spastic tetraplegia). In this group there are only 4 patients whose walking capacity may be recorded as good or fairly good. That progres-

sive operative treatment combined with a thorough exercising therapy in these cases may still give some favourable result, even though it be mediocre, is evident from the findings in my material, in which Groups II and III (spastic paraplegia and tetraplegia) include 17 patients (11 in Group II, and 6 in Group III) who had never been able to walk when they were admitted to Eugeniahemmet. Of these 17 patients 10 (7 in Group II, and 3 in Group III) are now able to walk well or fairly well, and 7 are moving about on crutches. In 9 other cases the ability to walk has improved considerably under the treatment.

As is well known, mental deficiency is a frequent finding in patients suffering from spastic paralysis. In a material like the present it would naturally have been of great interest to carry out intelligence tests after purely scientific methods. This has not been practicable, however, and we have had to estimate the intelligence of these patients more summarily, partly with reference to the result of their schooling. In the 104 cases included in this account the intelligence is good in 18 cases (17.3 %), fairly good in 29 cases (27.9 %), and lowered in 57 cases (54.8 %). Thus the intelligence has been lowered in more than half of the cases. This mental deficiency is most pronounced in Group III (spastic tetraplegia) with 59.5 %, and least pronounced in Group IV (general spasticity) with 37.5 %. Group I (spastic hemiplegia) shows a remarkably great percentage of patients with lowered intelligence (57.2 %). In his account of 91 cases of spastic hemiplegia Silfverskiöld found the intelligence lowered in 15 (16.5 %), and the deficiency was only slight in several out of these 15 patients.

Group IV (general spasticity) is the group that has been best equipped mentally, with a good or fairly good intelligence in 62.5 % of the patients. Group III (spastic paraplegia) shows the lowest figure for good or fairly good intelligence—namely, 41.5 %. The corresponding figure in Group I (spastic hemiplegia) is 42.8 %, and in Group II (spastic paraplegia) 46.7 %.

The deficiency in intelligence is distributed equally on the two sexes (respectively 54.9 % and 54.4 %), while good intelli-

gence is somewhat more pronounced in the male sex than in the female (respectively 19.6 % and 15.1 %).

Of the 104 patients 95 are either of school age yet or older. Of these 95 patients 34 (36.2 %) have received their school education in the public school with a good result, and 16 (17.1 %) with a middling good result, while 34 (36.2 %) were able only to grasp the teaching in the "backward class", and 10 (10.6 %) could not be taught anything whatever. In one case, impairment of vision made further school attendance impossible. Thus more than half of these spastic patients have done well or relatively well in the publich school, while the other half have been backward or altogether insusceptible to school education. Among the 34 who attended public school with a good result, 17 were dismissed according to the Public School Regulation 47, *i.e.*, with a certificate for having passed the highest grade of the public school. Of these 17 patients 3 belong to Group I, 7 to Group II, 5 to Group III, and 2 to Group IV. The greatest number of backward or unteachable patients are found in Group I (spastic hemiplegia) with 61.5 %, and the smallest number in Group IV, while Group III (spastic tetraplegia) shows the greatest percental number of patients that have attended public school with a good result—namely, 41.9 %. This is worth notice because the intellectual defect, as just pointed out, has been most pronounced in this group, which comprises the most severe cases of spastic paralysis.

This contrast can be explained only by the circumstance that the intelligence to some extent has been underestimated in these, mostly severe, cases of spasticity. On the other hand, there are not a few patients with an indisputable good mind, but suffering from a severe degree of spasticity who have not been able to pass through school with a perfectly good result, because their spasticity has prevented them from obtaining a good mark in some obligatory subjects—for instance, writing—and, furthermore, also the frequent impairment of speech in these cases may have impeted the learning of these patients. This suggests that the school education of spastic patients, which is far from always being so thankless and hopeless as

many seem to think, ought to be managed in some special way and under the direction of teachers who are sufficiently qualified for this task and are able to understand the often peculiar mind of such patients.

Finally, as to the sex distribution of the results obtained at school among these spastic patients, there is no particular difference between the two sexes. In this material the number of backward children and unteachable children is about the same for the two sexes (48.9 % for the males, 47.8 % for the females), whereas the number of patients who got along well in the public school is somewhat greater for the male sex (39.6 %) than for the female (32.6 %), that is, figures which are quite in keeping with those cited above in dealing with the mentality in the two sexes among spastic patients.

Even though the school education of the spastic patients thus looks more promising than assumed in general, the occupational training of this group of disabled is so much more hopeless. Of the 66 patients that have reached adult age, only 12 (8 men and 4 women) or 18.2 % have been amenable to any occupational training, and in most of these cases the training can hardly be looked upon as effective. No less than 54 (81.8 %) of these patients could not learn any occupation whatever, and among the minors there are no less than 23 for whom occupational training must be said to be altogether out of the question. Of those who learned a trade about half of the patients belong to Group II (spastic paraplegia)—what is only natural, as the arms are not affected in such patients. 5 have become tailors, 3 shoemakers, 3 have been trained in needlework, and 1 has gone through a weaving-school. None of these occupationally trained have reached to a state of complete self-support. Only 5 (7.6 %) are able to contribute in part to their support, while 55 (83.3 %) are quite incapable of any self-support whatever, and this possibility is also quite excluded in the cases of 23 minors. This is a very sad result, but by no means surprising to anybody that has been dealing with spastic cases. No less than 43 (65 %) of the adults receive support in the form of a state pension or municipal benefit, and 33 of these patients are

found to require continued institutional care (at present 5 of these patients have died).

I then shall go on to give an orthopedic-surgical survey of the cases here concerned, even though I realize perfectly well that I hardly skall be able to present anything new to this audience. 88 (75 %) of the cases have submitted to operative treatment, comprising a total of 456 operations (including also the operations which, according to available case records or information obtained, have been performed elsewhere before admission to Eugeniahemmet). Of these patients 63 improved after the operation even though the effect often has been rather slight. But it is an old orthopedic experience that in dealing with cases of spastic paralysis we are not allowed to have all too great expectations as to the result of the treatment. In 25 cases the operation was followed only by a temporary improvement or none at all. On the whole, the operative methods employed have been the ordinary measures that are well-known to any orthopedist, hence I shall speak about these operations but briefly.

Before mentioning these operations I should like to say a few words about my standpoint in general concerning operative treatment of the spastic cases. Of the spastic paralyses, as we all know, spastic hemiplegia has therapeutically the best prognosis, and in his dissertation Silfverskiöld has shown indeed how much may be accomplished in these cases through a well-planned and well-performed treatment. In my material this group is of minor interest, partly because these cases are relatively few in number, partly because a majority of them have been particularly severe, associated with considerable mental defects. In the present material the chief interest is attached to Group II, the *spastic paraplegia.* More than half of the operations performed fall in this group. Besides spastic hemiplegia, *Little's disease* is that group among the spastic cases where we may reckon with the best results from the instituted operative treatment, provided that the mentality of the patient is fairly good (an indispensable condition for an effective treatment) and that there are no disturbing complications. This applies to the relatively mild and moderate cases. The severe cases with pronounced

spasticity and strong contractures are particularly recalcitrant to all treatment. Still, even in such cases some good results may be obtained by operative treatment, but we have to reckon with the probability that the treatment will be rather demanding as to patience and protracted, lasting often several years.

In most cases of *spastic tetraplegia* any operative treatment will be hopeless, partly because the mental defects in this group generally are more pronounced, partly because the spasticity here is more extensive. Furthermore, the upper extremities, one of them or both, are affected too—something that makes it much more difficult, and often impossible, to get these patients on their feet. But even in these cases we may be able by operative measures to obtain some improvement; and each little improvement is of some value in the troublesome situation these patients have to bear. This fact is something we must realize always, and not summarily turn down these cases as hopeless asylum cases —something, I regret to say, a great many of them must turn out to be. If, for instance, we succeed in enabling such a patient to get about by himself, even though it goes but slowly and only by the means of crutches, this result is no small break in the clouds of his existence.

As to Group IV (general spasticity often associated with pronounced athetosis), I look upon any form of operative treatment as a rule to be useless. Only one of these patients was submitted to operative treatment. This was a girl with a marked degree of spasticity whose continual compulsory movements gave rise to troublesome wounds and ulcerations. Radical nerve resection gave merely a temporary improvement.

As a concluding remark concerning the treatment of spastic cases, I wish to state that anybody who treats such cases must realize that we practically never obtain complete restoration to health—a view which no doubt is subscribed to by any orthopedist of some experience. Here, more than in any other field in orthopedics, we get to know our limitation. In many cases, it is true, we are able with good effect to correct the contractures and deformities present, but as yet we have not been successful in curing the underlying lesion itself. A spastic patient

will always remain a spastic, and it is this fact that places the spastic cases medically as well as socially in a class by themselves.

After this general survey I wish briefly to say a few words about some of the operating methods that have been adopted. As to achillotomy, like most orthopedists, I have given up completely the subcutaneous method and employ now always the open achillotomy which implies a far better estimation of the measure required, and involves no risk of pes calcaneus. In all the cases which had been treated previously in the Stockholm V.F.A. and later were admitted to Eugeniahemmet, subcutaneous tenotomy had in many instances resulted in pes calcaneus, often in a severe degree, that required operative treatment in several instances. I wish to point out a little technical detail concerning achillotomy: one should always try as far as possible to suture the tendon sheath, which often is very thin, in order to obtain a better sliding and prevent formation of adhesions.

Resection of the obturator nerve with total resection of the posterior branch as well as the anterior, as performed in 20 of these cases, gives a good and quick correction of the adduction contracture in the hip-joint. But even when this operation is performed radically there is yet a risk of relapse—as I have observed in some cases. But the risk of relapse is far greater in adductor myotomy. I have cases in which it has been necessary to repeat this operation once or twice at intervals of one or two years. In 5 cases I have resected the obturator nerve ad modum Selig-Loeffler, that is, at the entrance of the nerve in the obturator canal. This operation gives an extraordinarily good effect, but it is indeed a rather great operation even if it does not imply any technical difficulties. In smaller children, in whom the nerve is not to big, however, it may sometimes be difficult to find it. No doubt, resection of the nerve below Poupart's ligament together with myotomy of the pectineus is preferable and now, I think, the prevailing method for treatment of the spastic adduction contracture in the hip-joint.

A particularly valuable addition to the operative treatment of spastic deformities of the lower extremities is given in Silfver-

skiöld's transplantation of the origin of muscles, turning two-joint muscles of the lower extremities into one-joint muscles. I have employed this method in a good many cases, with good result. This applies in part to correction of the spastic flexion contracture in the knee-joint by means of transplantation of the tuberous musculature to the posterior surface of the femur, partly to transplantation of the rectus femoris to the anterior surface of the femur in flexion contracture in the hip-joint, and partly to transplantation of both heads of the gastrocnemius to the tibia and the head of the fibula for correction of the spastic pes equinus. I have performed these operations in 79 cases altogether, belonging mostly to Group II (spastic paraplegia), and I have received a vey definite impression of the effect being good. This applies in particular to the last-mentioned operation, transplantation of the heads of the gastrocnemius, which I have performed in 35 cases, and which I now employ nearly always when the aim is to correct a spastic pes equinus. In many cases, however, I have found it necessary and more effective to combine this operation with elongation of the Achilles tendon, especially in pronounced cases where the contracture in the ankle-joint is not counterbalanced completely by the transplantation of the gastrocnemius.

I do not think I am exaggerating that these operations constitute the best adjuvant we have gained in recent years in the treatment of the spastic contractures of the lower extremities; and I think this is a method of treatment that will hold its own in the long run—in contrast to so many other new suggestions that fail to keep what they seemed at first to promise. The method deserves a good reception, for it is well-balanced, and it is based on a judicious and rational anatomical reasoning. (In connection with this paper I shall demonstrate some cases that have been operated after this method with good result.)

As shown in Table 3 I have employed nerve resection ad modum Stoffel to a fairly large extent. According to my experiences, this method seldom gives a lasting good result, especially not in the more severe cases, except in the aforementioned resection of the obturator nerve, which was also given by Stoffel.

Often the primary result is surprisingly good, but the relapse will appear sooner or later, even when one thinks the operation has been rather radical—and it must be radical if it is to bring any effect. It is especially in flexion contractures in the knee-joints that I have made use of Stoffel's method, and in doing so I have followed the directions he has given and resected the nerves to the biceps, semimembranosus, and even semitendinosus, which he as a rule leaves intact. With the extremely precise anatomical directions Stoffel has given there is no difficulty in finding these nerves without employment of the electrical examination recommended by Stoffel.

In many cases, however, I have combined this method with some other method (tenotomy, or transplantation of the origin of the tuberous musculature) in order to correct the deformity more thoroughly. In severe spastic paralysis of the upper extremities I have resected the various nerve trunks according to Stoffel, but without any lasting result. On the whole, the severe spastic paralyses of the upper extremities are particularly resistant to all treatment. From this rule I leave out the pronation contracture, where myotomy of the pronator teres and pronator quadratus gives a good result. In refractory cases I have combined this method with nerve resection.

In marked inward rotation of the lower extremities I have corrected the deformity with good result by means of transplantation of the greater trochanter (resection of the trochanter by chisel and suturing it together with its musculature to the femur, but more medially). The effect is excellent and lasting. In his dissertation Silfverskiöld has recommended this operation.

An experience that undoubtedly has been made by everybody who has occupied himself with these spastic cases is that so many of them show a marked degree of pes plano-valgus. I do not know the cause of this. In some cases, no doubt, it is the result of a previous operation, but I have often encountered it in cases that never were treated before. In several cases this deformity has required correction by means of tarsectomy or subtalus arthrodesis. In pes calcaneus (secondary to tenotomy)

I have employed Putti's blocking operation with a piece of bone taken from the tibia that is inserted partially into the trochlea of the talus so that the projecting part of this bony splint puts a stop to abnormal dorsal flexion of the foot. I usually employ the same operation also for treatment of paralytic pes calcaneus.

In recapitulating my experiences with the spastic cases I have had under observation and treatment in Eugeniahemmet, making the reservations I mentioned before with a view to the special nature of the present material, I wish to set forth the following points:

1. In most cases of spastic paralysis the condition is congenital; only in relatively few cases is it acquired, in the first years of life. This applies especially to cases of universal spasticity, but also largely to spastic paraplegia and tetraplegia, in a lesser degree also to spastic hemiplegia.

2. Mental defects are present in more than half of these spastic cases, being particularly conspicuous in spastic tetraplegia. At the most, every fifth spastic child may be regarded as possessing a normal intelligence. The best intellectual habitus is often encountered in children with general spasticity.

3. Teaching of spastic children with relatively good, and also merely moderate, intelligence gives good results, provided that it is manged by teachers suitable for this task. Also in the group of backward children may the teaching give surprisingly good results, but here a suitable and understanding teaching personnel is an indispensable prerequisite. Children with universal spasticity, often associated with athetosis and disturbances of speech, ought not to be taught together with other crippled children even though the mental defects would make no hindrance. Such children require a teaching personnel with particular qualifications; further, such children, with a marked degree of spasticity, will often mean a very disturbing element in the ordinary class, and their frequent disturbances of speech will impede the instruction in general. On the other hand, there is no reason not to teach children suffering from spastic hemiple-

gia and spastic paraplegia without mental deficiency together with other crippled children, excepting hemiplegic cases in which the ability to write is greatly impaired.

4. As a rule, the outlook for an effective occupational training of spastic patients is very poor except in suitable cases of spastic hemiplegia. Only a few of these patients are enabled to contribute to their support, and a greater majority of these patients have to be cared for in asylums.

5. As to the orthopedic treatment of spastic patients, the reader is referred to my remarks above.

During the period of 1920—30 a total of 227 spastic patients were treated in the Hälsingborg V.F.A. or passed through its policlinic. Of this total, 21 patients (about 20 %) have died, most of them at a young age. 14 cases belonged to Groups III and IV, that is very severe cases of spasticity. Among the remaining 206 cases, information is still wanting about 86, so that the available material for comparison comprises 120 cases (59 males and 61 females). From Tables 4 and 5 it will be noticed that 68 of these cases (29 males and 39 females) belong to Group I, spastic hemiplegia; 35 (22 males and 13 females) belong to Group II, spastic paraplegia; 5 (4 males and 1 female) to Group III, spastic tetraplegia; and 12 (4 males and 8 females) to Group IV, general spasticity. To me it seems evident, however, that the principles for classification of patients in Group IV are not the same for the material from Eugeniahemmet as for the Hälsingborg V.F.A. To this group I reckon patients with usually universal spasticity, most often associated with pronounced athetosis—*e.g.*, cases of the type *chorea duplex with athetosis*—while a majority of the Hälsingborg V.F.A. cases that have been entered in this group most likely have been pronounced spastic cases of the triplegic and tetraplegic types. This naturally has brought about that Group IV in the Hälsingborg material is made up almost exclusively of mentally deficient patients, as in my opinion the patients who were suffer-

ing from universal spasticity of the type I have emphasized above as a rule are very well equipped mentally, often quite clever though greatly handicapped by the marked spasticity.

At times it may be rather difficult to decide how a case of spasticity is to be classified, and this applies in particular to the patient material consulting the V.F.A.'s, where the classification often is based entirely upon merely one policlinical examination. It is almost out of the question, indeed, by such an examination with certainty to be able to estimate the mental capacity of a given patient, so that it happens sometimes that the result of such an examination is misleading. That this has been the case in some instances in the Hälsingborg material is evident from the fact, that of the 30 patients characterized as imbecile and dullards (entered in Table 4 under the heading: Intelligence markedly lowered) several have yet been able to keep up with the school work in the backward class and also in the middle classes of the public school. I call attention to this point in order to explain the rather considerable divergences in the results of the examinations of the materials from the Eugeniahemmet and from the Hälsingborg V.F.A. As pointed out already, the material from Eugeniahemmet is made up to a large extent of physically very severe cases, while the truly imbecile patients have not been included in this account, especially when they have stayed here only for a short length of time, and then have been discharged as soon as their mental state was ascertained.

The dissimilarity of the two materials is evident also from the fact that in the Hälsingborg V.F.A. more than half of the patients belong to Group I (spastic hemiplegia), while this group in Eugeniahemmet is represented only by 14 cases, whereas cases of Little's disease and, above all, cases of spastic triplegia are considerably less frequent in the Hälsingborg V.F.A. than in Eugeniahemmet (39 against 82). The spastic condition is recorded as congenital in about 50 % of the Hälsingborg material (88.4 % in Eugeniahemmet). The spasticity is far more pronounced in the cases from Eugeniahemmet (very pronounced in 60 % as against hardly 30 % in the Hälsingborg material);

and complications are present in 12.5 % of the Hälsingborg material as against 27.9 % in Eugeniahemmet.

As to the occurrence of mental defects in Groups I and II there is no particular difference between the Hälsingborg material and that from Eugeniahemmet; still, the mental state of the hemiplegic patients is at a higher level in Hälsingborg than here (respectively 57.4 % and 42.9 % with good or fairly good intelligence). The corresponding figures for Group II are 54.3 % and 46.7 %, that is, also a somewhat higher percentage for this group in the Hälsingborg material. The cases of spastic tetraplegia are too few to allow of any conclusion. As to Group IV, I have pointed out already that a comparison is not justified on account of the difference in the nature of the two materials. On the whole, however, it may be said of the Hälsingborg material too that mental defects are present in about half of the patients with spastic paralysis. But the great number of hemiplegic cases in the Hälsingborg material increases rather considerably the number of patients with normal intelligence (43.3 % as against 17.3 % in Eugeniahemmet), for the same reason, the result of the school education shows a corresponding difference.

In Hälsingborg 65.8 % of the patients have attended the public school with a good or fairly good result, as compared to 53.3 % in our institution. On the other hand, the percental number of patients who were unable to assimilate anything whatever from the school education is considerably greater in the Hälsingborg material because the imbecile patients (20 % as against 10.6 %) have been included in this account.

But far the greatest difference in the two materials, however, is found in the results of the occupational training. In the Hälsingborg material no less than 37 % of the spastic patients have been able to attain physical training, as against 13.5 % in Eugeniahemmet, and here it is to be pointed out that the patients with Little's disease percentally have shown a greater adaptability than have the hemiplegic patients (48.6 % as against 32.4 %). This indicates that the cases of Little's disease here concerned have been of a relatively mild character.

But the effectivity of the occupational training is found to be inferior to that encountered in the hemiplegic cases. Only 11.5 % of the former have attained to full self-support, as against 19.1 % in Group I (spastic hemiplegia). So the results from the Hälsingborg V.F.A. are hardly in conflict with my previous statement, that effective occupational training of a spastic patient belonging to Group II, III or IV is exceptional, and even among the hemiplegic patients it is as a rule only the mild cases that are suitable for such a training.

No less than 83 (69.2 %) of the Hälsingborg cases (as against 65 % of the material from Eugeniahemmet) receive state or municipal support.

As to the operative treatment of the patients who entered the Hälsingborg V.F.A. in the period of 1920—1930, it does not present anything of particular interest. Of the 120 patients 58 (48.3 %) were given operative treatment, comprising altogether 128 operations (resulting in improvement in 84.5 % of operated cases, and no improvement in 15.5 %). (In Eugeniahemmet 75 % of the cases were treated operatively.) The operating methods have been the usual, chiefly myotomy and tenotomy. Nerve resection ad modum Stoffel has been performed in 19 cases, all involving nerve branches to the flexors of the knee-joint. Resection of the obturator nerve was performed in 5 cases. Transplantation of muscles ad modum Silfverskiöld was performed only in 1 case (transplantation of the tuberous musculature). In 2 cases a spastic club-foot was treated with talectomy after Whitman.

In summing up my investigation into the spastic material from the Hälsingborg V.F.A. in the aforementioned period, which has been of considerable interest for comparison with my own material from Eugeniahemmet, it seems justified to say that from a social point of view the account of the cases from the Hälsingborg institution lessens to some extent the rather depressing impression one can hardly help receiving from the account of my own material. But also the account of the Hälsingborg material confirms that the problem of spastic paralytics, medical as well as social, means a crucial task for us orthopedists and that it still is waiting to be solved.

TABLE 2. (Table 1 is placed on the next page.)

Comparison of Cases of Spastic Paralysis admitted to Eugeniahemmet, Stockholm, in the Period of 1921—1937.

Diagnosis	Sex		School education				Occupational training			Self-support				Disability benefit.		Cont. asylum care
			Public school													
	M.	F.	Good result	Middling result	Backward class	None	Received o.t.	No access to o.t.	O.t. hopeless	Complete	Partial	Nil	No prospect	S.[2])	M.[3])	
Group I	4	10	4	1	6	2	1	7	1		2	5	1	2	4	5
Spastic hemiplegia ...			1+3	0+1	2+4	1+1	0+1	3+4	1+0		0+2	2+3	1+0			2+3
Group II	26	19	15	9	16	5[1])	6	23	9		3	22	9	15	3	10
Spastic paraplegia (Little's disease)			9+6	6+3	9+7	2+3	5+1	15+8	3+6		3+0	14+8	2+7			5+5
Group III	19	18	13	4	10	4	3	21	11			25	11	13	4	16
Spastic tetraplegia ...			8+5	0+4	8+2	2+2	2+1	12+9	4+7			15+10	4+7			10+6
Group IV	2	6	2	2	2		2	3	2			3	2	3	1	2
General spasticity			1+1	0+2	0+2		1+1	0+3	1+1			0+3	0+2			1+1
Total	51	53	34	16	34	11	12	54	23		5	55	23	31	12	33
			19+15	6+10	19+15	5+6	8+4	30+24	9+14		3+2	31+24	7+16			18+15
			36,2 %	17 %	36,2 %	10,6 %										
			53,2 %		46,8 %											

[1]) In 1 case (male) on account of impairment of vision; later transferred to Blind-school. [2]) State pension.

[3]) Municipal aid.

TABLE 1. (Table 2 :

Comparison of Cases of Spastic Paralysis admitted t

Diagnosis	Sex		Time of onset of illness		Present age		
	M.	F.	congenital	Not congenital[3])	15—30 years or more	10—15 years	Under 10 years
Group I	4	10	8	6	8	5	1
Spastic hemiplegia	14				3+5	1+4	0+1
			57,2 %	42,8 %			
Group II[1])	26	19	41	4	29	13	3
Spastic paraplegia (Little's disease)	45				20+9	4+9	2+1
			91,1 %	8,9 %			
Group III[2])	19	18	34	2	24	7	6
Spastic tetraplegia	37				14+10	3+4	2+4
			94,4 %	5,6 %			
Group IV	2	6	8		5	2	1
General spasticity	8				1+4	0+2	1+0
			100 %				
Total	51	53	91	12	66	27	11
	104				38+28	8+19	5+6
			88,4 %	11,6 %			

[1]) 2 women died.

[2]) 2 men and 1 woman died.

[3]) Onset of illness: 1 at the age of 6 weeks; 1 at 4 months; 5 at 1 year; 4 at 3 years; and 1 at 6 years. (No information in 1 case)

ıced on page 237.)

ıgeniahemmet, Stockholm, in the Period of 1921—1937.

Intelligence			Spasticity		Complications (Athetosis, epilepsy, etc.	No. of operated cases	Result of operation		Walking capacity		
ood	Middling	Lowered	High grade	Moderate			Improvement	No improvement	Good or fairly good	Slight or poor	None
3	3	8	3	11	2	13	12	1	13	1	
+2	3+0	3+5	2+1	2+9					3+10	1+0	
8	13	24	23	22	9	43	35	8	22	18	5
+3	8+5	13+11	14+9	12+10					14+8	9+9	3+2
5	10	22	33	4	15	31	15	16	4	12	21
+1	3+7	12+10	16+17	3+1					1+3	8+4	10+11
2	3	3	4	4	3	1	1		4	2	2
+2	2+1	0+3	1+3	1+3					0+4	1+1	1+1
19	29	57	63	41	29	88	63	25	43	33	28
+9	16+13	28+29	33+30	18+23					18+25	19+14	14+14
3 %	27,9 %	54,8 %					71,6 %	28,4 %	41,3 %	31,8 %	26,9 %

TABLE 3.

Survey of the Operative Treatment of Patients with Spastic Paralysis admitted to Eugeniahemmet in 1921—1937.

Diagnosis.	No. of cases	*Operating methods.*	
I. Flexion contracture of elbow-joint	5	Nerve resection after Stoffel of the musculocutaneous nerve	5
II. Pronation contracture of the forearm	21	a. Open tenotomy of the pronator teres and pronator quadratus	15
		b. Nerve resection (Stoffel) of the median and ulnar nerves	6
III. Flexion contracture of the hand	4	Resection of the median and ulnar nerves	4
IV. Adduction contracture of the thumb	5	a. Nerve resection	3
		b. Myotenotomy of add. pollicis	2
V. Flexion contracture of the hip-joint	53	a. Subspinal tenotomy	14
		b. Op. ad mod. Souther	2
		c. Transplant. of the rectus femoris (Silfverskiöld)	37
VI. Adduction contracture in hip-joint	116	a. Myotenotomy of the adductors	91
		b. Resect. of obturator nerve	20
		c. „ „ „ „ ad mod. Selig-Loeffler	5
VII. Flexion contracture of the knee-joint	76	a. Open tenotomy of the flexors of the knee	30
		b. Resection (Stoffel) of sciatic nerve	39
		c. Transplantation of tuberous musculature (Silfverskiöld)	7
VIII. Spastis pes equinus	150	a. Subcutaneous achillotomy	69
		b. Open achillotomy	42
		c. Resection (Stoffel) of nerve branches to the soleus and gastrocnemius	4
		d. Transplant. of heads of the gastrocnemius (Silfverskiöld)	35

TABLE 3 (cont.)

	No. of cases		
IX. Inward rotation of lower extremities	7	Transplant. of the greater trochanter	7
X. Pes calcaneus	11	a. Wedge-osteotomy of calcaneus	2
		b. Blocking op. ad mod. Putti	3
		c. Arthrodesis subtalo	4
		d. Resection of nerve branches to the extensors of the foot	2
XI. Pes valgus	6	a. Arthrodesis subtalo	2
		b. Tarsectomy, cuneiform	4
XII. Pes varus	2	Tarsectomy ceneiform	2
Total	456	Total	456

TABLE

Comparison of Cases of Spastic Paralysis admitted to

Diagnosis	Sex		Time of onset of illness		Present age		
	M.	F.	Congenital	Not congenital	15—20 years or more	10—15 years	Under 10 years
Group I Spastic hemiplegia	29	39	25	43	56	12	
Group II Spastic paraplegia (Little's disease)	22	13	23	12	27	7	
Group III Spastic tetraplegia	4	1	5		5		
Group IV General spasticity	4	8	8	4	6	6	
Total[1])	59	61	61	59	95	25	

[1]) During this period 107 additional cases have been treated in the hospital o 59 have not yet answered the questions sent to them; and in 27 cases the presen Group I; 4 to Group II; 6 to Group III, and 8 to Group IV. Thus altogether 22 1920—1930.

ıe Hälsingborg V.F.A. in the Period of 1920—1930.

Intelligence				Spasticity		Compli-cations (Athe-tosis, epilep-sy, etc.	No of opera-ted cases	Result of operation		Walking capacity		
Good	Midd-ling	Lower-ed	Greatly lowered	High grade	Mode-rate			Impro-vement	No im-prove-ment	Good or fairly good	Slight or poor	None
33	6	18	11	6	62	6	35	32	3	63	4	1
17	2	9	7	13	22	1	22	18	4	26	5	4
1			4	5			2		2	1	2	2
1		3	8	11	1	8				1	2	9
52	8	30	30	35	85	15	59	50	9	91	13	16
3,3 %	6,7 %											
50 %		50 %								75,8 %	10,9 %	13,3 %

examined in its policlinic. Of these 107 patients 21 (9 men and 12 women) have died; address of the respective patients is unknown. Of those who died, 3 belonged to patients with spastic paralysis entered the Hälsingborg V.F.A. in the period of

TABLE 5.

Comparison of Cases of Spastic Paralysis admitted to the Hälsingborg V.F.A. in the Period of 1920—1930.

Diagnosis	Sex		School education				Occupational training			Self-support				Disability benefit.		Cont. asylum care
			Public school		Backward class	None	Received o.t.	No access to o.t.	O.t. hopeless	Complete	Partial	Nil	No prospect	S.[1]	K.[2]	
	M.	F.	Good result	Middling result												
Group I Spastic hemiplegia ...	29	39	35	16	10	7	22	38	1	13	18	32	1	36	5	5
Group II Spastic paraplegia (Little's disease)	22	13	15	11	3	6	17	16		4	10	19		24	3	3
Group III Spastic tetraplegia ...	4	1	1		1	3	2	3			1	4		5		
Group IV General spasticity	4	8		1	3	8		10	2			10	2	9	1	4
Total	59	61	51	28	17	24	41	67	3	17	29	65	3	74	9	12
			42,5 %	23,3 %	14,2 %	20 %	37 %			14,9 %	25,4 %					
			65,8 %		34,2 %			63 %				59,7 %		69,3 %		

[1]) State pension. [2]) Municipal aid.

Silfverskiöld, Stockholm:

To me Dr. Asplund's paper that is based on an unusually great and comprehensive experience has been of the greatest interest. It has given a very thorough review of the problems concerning spastic paralytics, not only from a therapeutic point of view but also seen under the angle of occupational training.

The factors that inhibt the capacity for movements of patients with cerebral spasticity are: lowered functional capacity of isolated innervations, spasticity, pareses, and contractures. Even under normal conditions the uncrossed two-joint muscles imply a certain degree of compulsory coupling. In pronounced spasticity this passive insufficiency becomes strongly inhibitory. This special coupling is abolished definitively through transplantation of the origin of such muscles. So in cases with the proper indications this method of operation is more rational than nerve resection or myotenotomy. The experiences from several hundred cases confirm this view.

For the treatment of inward rotation contracture in the hip-joint, chiseling off of the greater trochanter and its fixation anteriorly to its original location is a good operation. The degree of the transplantation is a delicate matter, however, that requires accuracy and precision.

Bentzon, Aarhus:

In the fifteen years that have passed since Silfverskiöld gave us his muscular transplantation method, with transformation of two-joint muscles into one-joint muscles, for treatment of spastic paralytics, I have employed these operations a good deal, but perhaps not so much as this very rational method deserves. In those cases where I have performed this kind of transplantation—moving the rectus femoris downwards, moving the flexors of the hip from the tuberosity of the ischium down to the linea aspera of the femur, and moving the heads of the gastrocnemius downwards—I have always obtained satisfactory results, and I have never seen any kind of complications whatever. To me this operation has seemed indicated in the more severe cases of spastic paraplegia and in the milder cases of

spastic monoplegia. In cases of the latter category I am able to recommend this method in particular, as it offers a greater chance than does any other method to really free the gait of the patient from its spastic character—in particular, the normal carriage of the leg in putting it forward is attained better after this operation than after other methods.

Guildal, Copenhagen:

After mention of the treatment of the spastic pes equinus by neurotomy of the nerves to both gastrocnemii and plastic elongation of the Achilles tendon, and the effect of this operation upon the contracture of the knee, G. referred to a paper by Ove Sheibel: "Om Behandlingen af den spastiske Spidsfod", Hospitaltstid., vol. 71, No. 30, 1928.

G. then mentioned the social problem involved in the combination of spastic paralysis and a low intelligence which comes above the limit of simplemindedness—cf. transactions of the Northern Association for Cripples Care at its meeting in Oslo 1938.

Camitz, Gothenburg:

I never operate on the upper extremities. But in practically every case of its kind I perform resection of the obturator nerve + myotomy of the pectineus + transplantation of the heads of the flexors and gastrocnemius.

As a rule, elongation of the Achilles tendon is performed too.

I have kept on doing so for the last ten years, and I am fairly satisfied with the results, and I recommend this procedure.

Langenskiöld,

If we put a spastic paralytic in a fixating plaster cast for some weeks, it often will take just as many months before he is able to walk just as well as prior to the operation.

Therefore I have avoided skeletal operations and other extensive operations that require fixation, and I have divided the treatment on smaller operations, so that the patient is able to

get on his feet as soon as the wound is healed, that is, after 10 days. I have always been able to correct the inward rotation by detatching the glutæus minimus from the iliac crest.

One feature I never have seen emphasized anywhere is the great power of regeneration possessed by the tendons in spastic paralytics—a phenomenon that perhaps may be due to the increased muscular tonus. To me this capacity for regeneration appears to be the main cause of a relapse after operation on tendons and muscles. Even after transplantation of the insertion of muscles ad modum Silfverskiöld I have seen that the scar between the muscle and its previous insertion has assumed the character of a tendon, so that the operation did not bring about the desired effect.