P. G. K. BENTZON:

AFTER-EXAMINATION OF HALLUX VALGUS PATIENTS TREATED WITH ARTHROPLASTIC RESECTION OF THE HEAD OF THE FIRST METATARSAL BONE

While I was secretary general of this association, I tried several times to have Hallux valgus made the subject of a joint discussion for surgeons and orthopædists at a Scandinavian congress. It was turned down regularly by the surgeons who considered the subject too special—and in this way were probably right, as it may be doubtful whether such a discussion would have been profitable. The question is by no means insignificant, however, and it cannot be shelved as exhausted till we can register a considerable higher percentage of recovery from this affection which is very important alone by its apparently increasing frequency.

Patrik Haglund once said humorously that the divided hallus valgus patients in two large groups: 1) patients who had been treated by *others* and then consulted him, and 2) patients *he* had treated, who then went to other doctors. This remark is characteristic of the faculty of our beloved master to express himself in pointed and striking paradoxes, and even if it not to be taken all too literally or seriously, it is not stretching the matter beyond all rhyme and reason either. The results of the operative treatment of hallux valgus are on the whole not satisfactory; the numerous operative methods which keep on being modified and combined bespeak this fact. Even though we meet now and then in the literature some accounts of reexaminations that appear to show a fair percentage of recovery, a more thorough review of the data will often show that many of the reexaminations are most incomplete. When, for instance, in a

report by v. Salis from the Basal clinic, only *18* out of 29 patients are reexamined, the statistical account may be said to be rather worthless.

When the entire patient material is reexamined the results are often found to be poor. At the congress at Cologne 1926, Bragard (München) presented collectively some of these account (reported by Brandes, Mau, and others) and held that the truly critrical review of the figures would leave only about 50 per cent of the results as quite satisfactory; he would count the treatment as successful only in those cases which the respective authors entered under the heading »sehr zufrieden«, while the group »zufrieden« had to be reckoned as »middling«. At this congress, it is true, both Brandes and Mau protested against Bragard's way of treating these figures; and Brandes would have only 9 per cent of his material classified as »Misserfolge«. But, in my opinion, this percentage means rather many unfavourable results.

We really have no precise criteria by which we may estimate the operative results in hallux valgus as satisfactory or nonsatisfactory. If, for instance, we consider hernia operations, the number of recurrences can be given quite precisely, but to estimate the result of an operation for hallux valgus must to some extent be a matter of judgment. X-ray pictures before and after the operation can naturally tell us something about the purely anatomical result, but this is absolutely not the decisive factor. An anatomically successful operation must be characterized as a failure if the patient has pains on walking, and an anatomically inferior result may be excellent if the patient has never any inconvenience from his foot.

What are we to do to better our results in dealing with hallux valgus? The point is, above all, to establish the right *indications* for the treatment, that is, we must analyse the symptoms individually, and if we think a case requires operative treatment we must employ a rational method which we master technically. This point, I know, sounds rather ordinary and obvious. Yet, the trend of reasoning seems often to run along this track: hallux valgus is hallux valgus, and if the patient is troubled

with pain of the foot he is to be operated on—after the method once adopted.

I shall not here deal particularly with the etiology of the affection but keep to the treatment. It should be said, however, that the attempts made by some authors to place the primary cause of the deformity elsewhere than in the first metatarso-phalangeal joint where the morphological changes are the most pronounced, will seem rather artificial in most cases. The medial sector of the human foot in its present form is phylogenitically a »late«acquirement and therefore subject to considerable variation and a corresponding anatomic-mechanical *weakness*, involving in particular the first metatarso-phalangeal joint which is exposed to great strain. If the »stability« of this joint fails the anatomical and statical conditions together with our present foot-wear will always lead to the development of a hallux valgus deformity. On the other hand, it is only in quite exceptional instances that hallux valgus is associated with phenomena which require any other explanation than insufficiency of this joint. One might imagine that in a good many cases the insufficiency would be ascribable not to the purely articular elements but to the musculature involving the joint. In this connection, however, it is worth mention that hallux valgus as a true paralytic deformity must be reckoned a rare condition, even in cases of poliomyelitis with extensive paralysis of the musculature of the foot, hallux valgus develops but remarkably seldom. I am well aware that this observation may be interpreted also in another way, as demonstrating the decisive significance of active muscular traction to continuous aggravation of the deformity—but this falls outside the scope of the present subject.

As to the symptomatology of the deformity, it should be stated in the first place that a great many, even morphologically severe, cases give almost no discomfort. This applies in particular to men who are able in their foot-wear to make proper allowance for the deformity; often they feel no pain or tenderness that amounts to anything. But there are also many women in whom the cosmetic drawback is the only subjective incon-

venience of the deformity if they take the trouble to get their shoes wide enough.

Continually relapsing bursitis and periostitis of the head of the first metatarsal bone must be considered the most classical symptom of hallux valgus. But here, like in other diseases, the classical symptoms are not the most frequent. Discomfort from downward displacement of the anterior metatarsal arch is far more frequent. I am not able to give exact figure for documentation of this because it is difficult to estimate when the abduction of the great toe is marked enough to be designated as hallux valgus.

If we are to divide the hallux valgus patients after their symptoms along entirely practical clinical lines, the groups arranged after the frequency of the symptoms will be as follows:

1) Cases *without* any particular subjective symptoms.

2) Cases with slight discomfort from the bunion but with *depressed anterior arch tenderness.*

3) Cases with classical *bunion symptoms as well as depressed anterior arch symptoms.*

4) Cases with *bunion trouble* but *without depression of the anterior arch* or *symptom-free anterior arch depression.*

What therapy is to be recommended in each of these four different groups?

Ad 1: It happens not infrequently that these patients—especially the female—wish for cosmetical reasons to be treated for this deformity. But if the treatment is to answer the purpose—to make the foot more neat and easy to fit with shoes—it must be a radical operation. On the whole I wish to caution against the performance of a hallux valgus operation on cosmetical indication alone. At any rate the surgeon has to be perfectly sure of the reliability of the method and his technique before he consents to operation on this indication.

Ad 2: The more difficult hallux valgus operations (resections) must be looked upon as *contraindicated.* The therapy must aim to restore the anterior metatarsal each, eventually by unbloody *correction* with fixation in plaster of Paris, with marked accentuation of the anterior metatarsal arch. Certain

conservative hallux valgus operations may be in order in some cases.

Ad 3: Operation for hallux valgus may be performed. It is to be kept in mind, however, that resection of the head of the first metatarsal bone will not relieve the symptoms of a depressed anterior metatarsal arch—on the contrary, it is apt to aggravate them. So, besides correcting the abduction of the great toe. The therapy must also include an energetic correction of the deformity of the anterior metatarsal arch.

Ad 4: This group—with »bunion trouble« as the only subjective symptom—is not very large, but it covers the cases that are most suitable for the most common operative treatment.

In a paper published in 1930, Timmer, a Dutch orthopædist, enumerates 25 different operative methods for hallux valgus—but counting all minor modifications too the list will probably be considerably longer. The time does not allow me here to review all these operaive methods, but they may conveniently be divided into two groups: 1) the more conservative operations on tendons, and 2) the more radical operations on the skeleton. The latter group may again be divided into two subgroups: a) operations aiming to correct the deformity without directly entering into the first metatarso-phalangeal joint, and b) operations involving this joint directly.

After fixation of a fully developed hallux valgus, the deformity can no longer be corrected by tenoplasty. In milder cases where a moderate hallux valgus deformity is to be taken properly as a part in a general depression of the anterior metatarsal arch, tenoplastic operations may be employed successfully, but such cases are rather infrequent. Here I shall mention Slomann's transference of the extensor hallucis to the medial side of the foot. I have tried this method in a few suitable cases, with good results. Erlacher has given a method after which the insertion of the adductors of the great toe is transferred from the first phalanx to the metatarsal bone; I have tried this method once as a supplement to Slomann's method, and the result was quite satisfactory.

As to all the many operations on the shaft and neck of the metatarsal bone, on the first cuneiform and on the first phalanx of the toe, they hover about the seat of the trouble instead of going straight at it.

It cannot be proved, of course, but it seems probable that the orthopædists who have worked out these methods have tried previously the much simpler solution of the problem given long ago by Hueter in resection of the head of the metatarsal bone, before they made a try with their more artificial osteotomy—perhaps because of poor results with Hueter's simple method.

For a long time I held back from resection of the metatarsal head because we saw in the clinic not infrequently patients on whom such an operation had been performed elsewhere with very poor results—complete ankylosis of the joint with marked invalidity of the capacity for walking. But after I had modified the operation from resection to real arthroplasty, by which I expected the risk of ankylosis to be excluded, I felt sure of the serviceability of the operative treatment.

Before I adopted the arthroplastic operation which I shall describe in the following, I tried some of the operative methods recommended by others: chiseling-off of the prominent part of the metatarsal head after Scheede's method, cuneiform osteotomy of the neck of the metatarsal bone. The results varied a great deal.

All these operations which spare the head of the metatarsal bone are subject to three objections of principle:

1) They relieve the patients only in part of the greatly protruding head of the metatarsal bone, so that the benefit is doubtful as far as future fitting of footwear is concerned.

2) They do not relieve the patients of the concomitant arthritis.

3) The effect of the operation is too difficult to figure out beforehand. A good orthopædic plastic operation must be as exact as possible, *i.e.*, it must be possible to calculate the operative effect quite accurately, as the results will otherwise be too unequal and too variable for any fairly exact prognosis.

I think the arthroplastic resection I have employed since

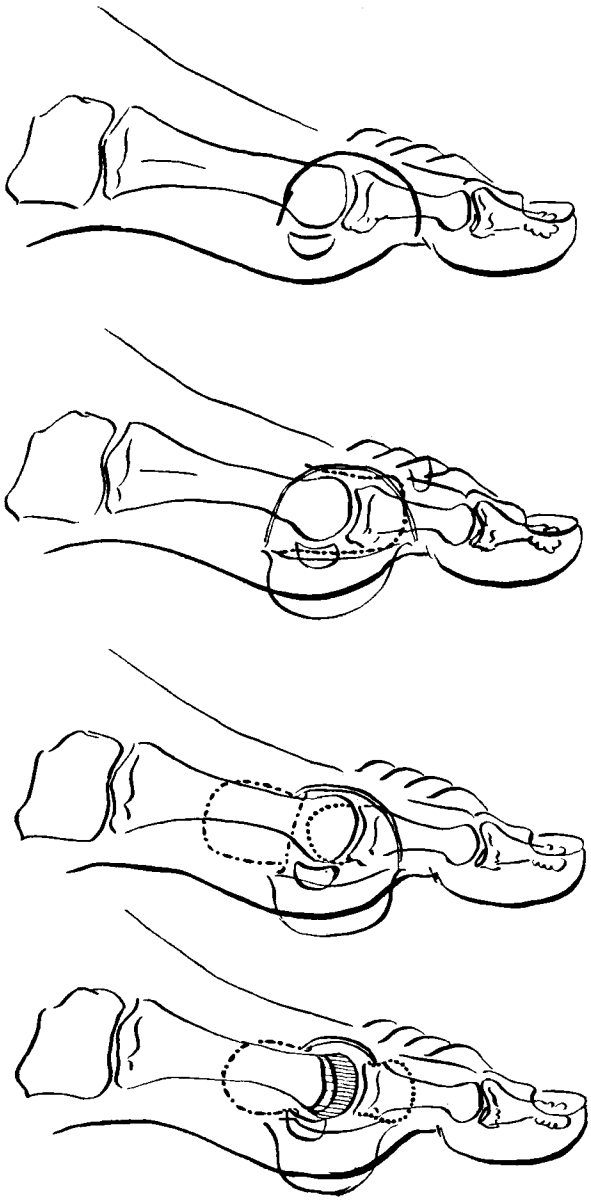

Fig. 1.

1929 meets the requirements of exactness. In reality this operation is merely a modification of Mayo's resection with interposition of the bursal flap, but the point is its deliberate performance as a regular arthroplasty.

The various phases of the operation as sketched in figur 1 are:

1) Upwards convex, arcuate incision on the medial side of the joint. The arc is not to encircle the exostosis of the metatarsal head, but its centre must be on line with the joint cavity, so that the anterior part of the flap covers the base of the phalanx. The flap is turned down throught careful dissection, leaving only cutis in the flap while all bursal tissue and other subcutaneous tissue must remain on the metatarsal head and phalangeal base.

2) Another flap is made from this tissue. This flap is large, wide and thick, attached proximal, and consisting mainly of the bursal sac, besides the scanty subcutaneous fat and connective tissue. The fibrous elements of the joint capsule are not to be included in this flap. (Here my method differs from that of Mayo who includes the fibrous elements in this flap.) The bursal flap must be so large and wide that it will easily cover the entire resection surface when the metatarsal head is removed; it is advisable therefore to begin the dissection of the flap far anteriorly, on the toe.

3) When the bursal flap is dissected free a new flap is dissected out, beginning just distally to the base of the preceding and consisting of the fibrous tissue covering the bone and joint; this flap is attached to the base of the phalanx at the joint line.

4) After these maneuvres have been performed, the joint cavity is at the same time opened widely enough to bring the metatarsal head clear in the operative field. Now resection of the head is performed to the extent required by each individual case. It is here the »measurement« must be exact, depending upon the degree of the hallux valgus adduction. The cut surface of the bone must be smooth, preferably a little convex. This can readily be obtained with the string-saw, while it is impossible to resect the metatarsal head so precisely and smoothly with a chisel. How much bone is to be removed? I am resecting from 10 to 17 mm. making the resection considerable smaller than is generally the rule. After the resection the cut surface of the bone is rounded very carefully so that its convex stump corresponds as closely as possible to the concavity of the phalangeal joint surface. On reexamination of these patients several years after the operation you will find that the two articular surfaces always adjust in the course of time their form to each other. (See fig. 2). The more precise this adjustement is made primarly at the operation the more easy it will be for the tissues to get into working order.

5) When the cut surface of the bone is nicely rounded and smooth, the operation is soon finished merely by folding the bursal flap over the resected bone surface and suturing the small fibrous flap on the *outside* of the bursal flap. Previously I used fishgut for these sutures—as for all other subcutaneous sutures—but it happened to me twice that I had to remove such a fishgut suture because it could be felt through the skin and »tantalized« the patient. In this one place I now employ catgut which I otherwise hate to use—*but it is no good to be doctrinary.*

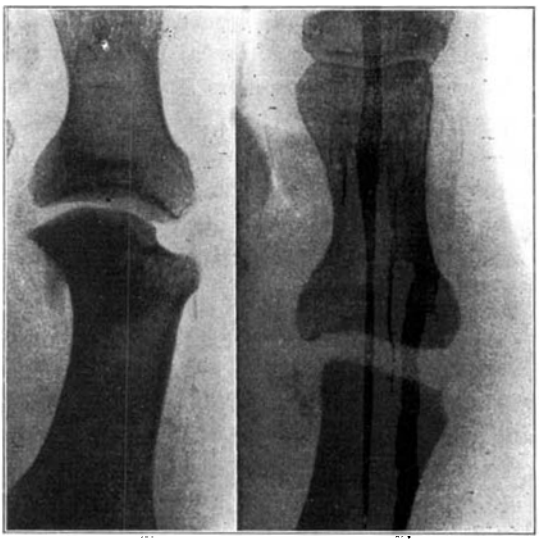

Fig. 2.
a. shows the articulation 3½ years after an operation, of which the primarly result is shown in b.

6) The sesamoid bones are not touched at all. In some of my earlier cases I enucleated these bones because I was afraid they would give trouble by locating right under the edge of the resection. But it was found, as is only natural, that these bones slide back under the metatarsal, where they lodge firmly; as they are important to the whole structure of the anterior metatarsal arch, they should be preserved.

7) In bandaging the foot nothing is done for a stronger correction of the valgus position. I usually put a tampon between the first toe and the second, but no varus position is aimed at.

8) As early as 5—6 days after the operation I begin with light passive motions in the basal joint. The skin sutures are removed on the 10th day;

massage and exercise commence 13—14 days after the operation. The patient gets up, with a plate in his shoe, about 17—21 days after the operation (a little sooner with unilateral operation than with bilateral). The plates are made with well-fitting transversal arch elevation, and in most cases the patient will have to keep using such plates. Of course, it would be better if the patient could be free from the trouble of such a plate, and in some instances he can safely discard the plate after some length of time, but most patients should use them continually.

From 1929 to 1933 I have operated 22 patients after this method; as the affection was bilateral in half of them it makes altogether 33 cases of hallux valgus. I am rather reserved with regard to operation and critical in my indications. The 22 operated patients were picked out among no less than 142, who have consulted me in the same period for hallux valgus. All the 22 patients have been reexamined, most of them with roentgenography, a considerable length of time after the operation.

In 20 of these patients the result can be characterized as quite good, that is: the patients are satisfied with the operation, their feet look »normal« and meet all the occupational requirements; the younger patients are even able to dance as much as they like and use ordinary shoes, but most of them have to keep using plates with thansversal arch elevation. Several cases show a remarkable improvement of the symptoms. To illustrate this improvement I may cite what happened a few days ago. On occasion of this paper I phoned the other day to a lady I had operated two years ago for bilateral hallux valgus. I asked her if she remembered she had been operated. Yes, she said, for a boil of the neck. No, I said, an operation on the feet. That must be a mistake, she thought at first. Then some light dawned at last and she said: Oh yes, that is right, now I remember; I had my bunions operated a couple of years ago—I forgot all about them, you see, because I never feel them any more. It has to be admitted, however, that such complete recovery is not the rule.

The therapeutic result of the operation was not quite satisfactory in two patients, both women, aged 52 and 39 years respectively. In both cases the indications for an operation had been too slight. The 39-years-old women consulted me for a

hammer-toe, and we agreed to repair a moderate but almost symptom-free condition of bilateral hallux valgus at the same time. For a long time after the operation she complained of soreness of her left foot—the right one was all right—on motions in the metatarso-phalangeal joint even though the mobility was good.

The other patient was troubled previously with rather severe discomfort of the anterior metatarsal arch. The great toe is perfectly all right but the metatarsal arch discomfort has not subsided in spite of plates with marked elevation of the arches and subsequent attempts to improve the condition by hammer-toe operation of the third and fourth toes. She walks a great deal—very rapidly and apparently in a perfectly normal way—but there is marked plantar prominence of the heads of the second and third metatarsal bones.

DISCUSSION:

Camitz:

The cause of hallux valgus is a pes metatarsus planus. The whole anterior arch of the foot is lost. Insufficiency arises and in connection with this contracture of the abductor hallucis. Silfver's method is therefore the best as also Silfver's after-treatment in addition to a well made inlay which corrects the deformity. Bentzon's method does not reduce the insufficiency, it increases it.

P. Haglund:

Recommended wedge-shaped resection behind the I metatarsal bone and union of the extensor tendon and the volar muscular border into a strong inner wall; in some cases this should be done in conjunction with extirpation of the painful medial sesamoid bone. The treatment takes a long time by this method but rapid methods are rarely successful in orthopaedic surgery.

H. Nilsonne, Stockholm:

At the Hospital for Cripples in Stockholm I have in the course of 13 years witnessed several »hallux valgus periods«:

Hohmann's operation, *Schede*'s operation and *Mayo-Bentzon*'s operation. The last of these is the one we have adopted and I suppose by now we have performed at least 50 operations of this nature. It will be seen therefore that our experience of this operation is fairly great. To my mind the duration of treatment with this operation is the shortest, the cosmetic result equivalent with the best results obtained by other surgical methods and the functional result excellent.

H. Waldenström:

Since the operative treatment of this condition is under discussion and so much praise has been bestowed on Mayo-Bentzon's method I would only like to bear witness that very good results can also be obtained by continuity resections of the diaphysis in addition to removal of the so-called exostosis.

In doing this I think it is important to get plane cut surfaces in as close apposition as possible. To this end I begin by detaching the periosteum, then I carry a Gigli saw round the diaphysis close to the head, cutting through the diaphysis. The proximal portion of the diaphysis is lifted out of the wound and cut off with an Albee saw, so as to get a shortening of about 1 cm. The two fragments are drilled, a catgut thread is inserted through these holes and so tied that the cut surfaces are forced close against one another. The tip of the great toe is supported outside the dressing by an alluminium splint which keeps it inwards. The metatarsus is firmly bound together with a bandage, with a pad on the plantar aspect; the bandage is then carrid round each toe in turn pulling them inwards towards the great toe.