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RESECTION OF METATARSAL HEADS FOR PAINFUL AND INTRACTABLE PLANTAR CALLOSITIES. A REPORT OF TEN YEARS EXPERIENCE

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METATARSALGIA is a common problem arising from different causes. It is likely to be lightly considered by all except the victim who hobbles about as though he had a tack in his shoe. The multiplicity of procedures both operative and supportive designed for the alleviation of symptoms attests to the difficulty in successfully treating this condition. The purpose of this paper is to review the general problem of metatarsalgia and the results of treatment of this condition with metatarsal head resection.

Metatarsalgia by definition simply refers to pain in the general area of the metatarsal heads of the foot. Of course this is a common complaint in adults and in most cases can be dealt with adequately by means of shoe corrections and alteration of the weight distribution on the metatarsal heads. With improvement in shoe fitting and the use of aids such as metatarsal pads, metatarsal bars, arch supports and paring of calluses, the majority of individuals with this condition can be treated effectively.

It is realized that pain in the forefoot may be the result of interdigital neuromata (Morton's toe), bursae and tumors beneath the metatarsal heads and arthritis of the metatarsal-phalangeal joints. However we are here concerned primarily with metatarsalgia associated with painful callosities under one or more of the metatarsal heads which have become resistant to conservative measures. This may result from several causes: from a plantar wart under a metatarsal head which has not responded to the usual dermatological measures and which eventually presents as a healed plantar wart with a residual callus;² from a pressure callus resulting from disturbed metatarsal weight distribution,³ from a cavus foot with clawing of the toes or⁴ from residuals of metatarsal-phalangeal arthritis with dorsal dislocation of the proximal phalanx on the metatarsal.

Morton attempted to explain the disturbed weight distribution on the basis of a short first metatarsal, hypermobility of the second metatarsal, and pronation of the foot.⁹ Harris and Beath⁵ in their meticulous study of 7,238 feet conclusively disproved this theory. It seems in cases involving disturbed weight transmission that some factor has led to collapse of the transverse arch of the forefoot allowing depression of the second, third and fourth metatarsal heads.

When metatarsalgia arises from the aforementioned causes it usually presents a picture of pain in the plantar aspect of the foot accompanied by tender plantar callosities usually located beneath the offending metatarsal heads. Pain can be reproduced by digital pressure on the callus, by weight bearing, plantar flexion of the toes, and frequently by lateral compression of the metatarsal heads. The callosities are located most commonly beneath the heads of the second, third, and/or fourth metatarsals. They are more common in women and more likely to occur after the fourth decade. Plantar callosities are likely to become intractable and become regarded as plantar warts; however, as DuVries³ points out, it is questionable whether these are true verrucae. More commonly they represent callus formation in response to pressure or cicatrix formations secondary to local treatment. True plantar warts may occur at any place on the plantar surface of the foot. They are usually found anteriorly to the weight bearing areas and can be readily identified by their vascular center core which bleeds on paring.

Many procedures have been devised to deal with metatarsalgia associated with painful intractable plantar callosities. Dermatologists have some success using electro-dessication, cautery, radiation, or chemical agents. In many cases this approach is apparently successful but in some it is not, and usually adds to the size and persistence of the callus. Although paring the calluses provides temporary relief it, like excision of the area, affords no lasting cure even when excision is combined with skin grafting. Contrast this with the radical approach advocated by Dickson⁴ who excises the involved ray, toe, metatarsal, and plantar callosity in refractory cases. Other procedures of less magnitude are available and perhaps more applicable since Dickson's operation is best confined to a single ray, whereas this condition is frequently multiple. Giannestras⁵ has devised a metatarsal shortening consisting of osteotomy of the involved metatarsal in a step-cut fashion providing the necessary recession of the pressure point. This operation, like any osteomy, has the disadvantage of restricted activity in a cast until the completion of bone union. DuVries³ describes an approach based on removing the spike-like condylar processes which protrude into the sole with depression of the metatarsal head. While condylectomy seems rational our experience with this procedure is limited. Direct attack on the offending metatarsal head is the goal of two other procedures. That described by McKeever^{1,6} is accomplished by hollowing out the metatarsal head and replacing it on the pointed metatarsal shaft. The most direct approach is simply resection of the offending metatarsal head or heads. The latter procedure is the one employed at Henry Ford Hospital for this condition.

This paper presents a review of the results of metatarsal head resection for painful intractable plantar callosities. In the period from January 1950 to July 1960, 52 patients had a total of 85 metatarsal heads resected. The second metatarsal head was most commonly involved comprising 48.2 percent of those resected. As summarized in Table I, the third, fourth and fifth followed in that order showing equal distribution to the right and left feet.

Indications for resection were metatarsalgia associated with painful intractable plantar callosities refractory to conservative treatment in 45 patients or 86 per cent. Rheumatoid foot problems accounted for 8% and miscellaneous causes for 6 per cent.

RESECTION OF METATARSAL HEADS

Table I

Head Number	Right Foot		Left Foot		Total
2	21	24.7%	20	23.5%	48.2%
3	13	15.0%	14	16.0%	31.0%
4	5	6.0%	6	7.0%	13.0%
5	3	3.5%	3	3.5%	7.0%

There was a preponderance of females in the series: 33 or 61.5 per cent of the total. The average age of the group was 47.9 years tending to be older (51.3 years) for the women and younger (44.5 years) for the men. The duration of symptoms prior to surgery tended to be long, averaging 9.6 years. Most patients had been treated with multiple shoe aids during this time.

To evaluate accurately the results of this procedure which sometimes was done in association with other foot surgery, a personal examination was desirable. Of the original group 34 people responded and 28 presented for examination. The remaining six due to distance answered a detailed questionnaire regarding their case. Of this group, six were discarded as their symptoms were either due to rheumatoid changes or trauma. The remaining 28, having a total of 45 head resections, were analyzed for this follow-up study. An arbitrary rating was set up as follows:

- EXCELLENT . . . Long follow-up with no symptoms relative to original condition or resulting from surgery.
- GOOD Long follow-up with improvement maintained and minimal new symptoms.
- FAIR Condition improved by operation but new symptoms bothersome.
- POOR Operation no help or new symptoms as bad or worse than original.

Using these criteria the results of resection were analyzed for each metatarsal head and showed no significant difference in satisfactory results regardless of which head was resected. The recurrence rate for the whole group was a disappointing 50 per cent (Table II).

Table II
RESULTS BY HEAD RESECTED

Number	Excellent	Good	Fair	Poor
2	6	3	4	7
3	5	1	2	7
4	3	1	0	4
5	1	1	0	0

Analysis on the basis of the patient's age, duration of symptoms prior to surgery, or multiple versus single resections failed to show any significant correlation with results. The x-rays were also reviewed attempting to anticipate the result from comparison of the deformity with the surgical correction with no conclusive findings. From the standpoint of sex, it was interesting to note that most of the males had

a good or excellent result (eight of nine or 90 per cent), whereas a preponderance of the females had a fair or poor result (23 of 36 or 64%) (Table III).

Table III

Sex	Excellent	Good	Fair	Poor
Male	5	3	0	1
Female	10	3	6	17

The follow-up period ranged from one to eight years with the group averaging 4.0 years.

The two most frequently encountered undesirable results of this operation were shift of the pressure point from one metatarsal head to the adjacent one or more heads accounting for most of the poor results in the series, and retraction of the operated toe dorsally on the foot in a position to incur dorsal claw formation. We feel this latter problem can be obviated by doing an extensor tenotomy and removing a segment of the tendon to discourage regeneration at the time of surgery. In several cases having a poor result from the original surgery a second metatarsal head resection was done when the locus of pain had transferred to an adjacent head. The second procedure failed to alter the final rating in these cases. We believe the greater number of successful results in the males is significant and probably reflects the greater tendency for women to wear unsatisfactory footwear regardless of discomfort. Certainly wearing high heel shoes causes a shift of weight to the metatarsal heads. Narrow lasts cause crowding of the forefoot and a fairly high incidence of hallux valgus which has been frequently related to second ray metatarsalgia. It was noted that patients having multiple foot problems were less likely to have a satisfactory result from metatarsal head resection even when done in association with other procedures to correct those deformities.

It was our hope in undertaking this study that criteria for a successful operation could be established to increase the percentage of favorable results. This hope has not been realized. We are left with a procedure only 50 per cent effective in unselected cases regardless of which head is involved and more than twice as likely to be a success in males than in females. It does not seem to be as good an operation as was originally thought, though in specific cases it may give very satisfactory results.

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