

MITCHELL'S OSTEOTOMY FOR HALLUX VALGUS USING 1-0 VICRYL FOR STABILISATION

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ABSTRACT:

Introduction: Hallux valgus is the one of the commonest forefoot deformities. Apart from cosmetic perspectives it can be problematic because of its pressure effects. Though common in the age group of 30-60s in females of shoe wearing population, It's incidence in general population is also increasing. Many procedures have been documented in literature to correct such deformity. Mitchell's osteotomy is one of the treatment options for such deformity. This osteotomy is actually two transverse osteotomies in which one is incomplete, forming a step cut. The distal fragment is displaced medially and planter-wards aiming to restore the function of the feet.

Material and Methods: Thirty patients with ten bilateral feet's of hallux valgus deformities were operated at Bone and Joints hospital between the years 2007-2012. We had 23 females and 7 male patients with all the bilateral cases being females. The age group was between 19 years to 35 years. The follow up period was between 2 years to 7 years. The pre-operative radiograph of Antero posterior view was taken and recorded. The indications for surgery included pain, difficulty in foot wear and cosmeses.

Results: All patients were assessed according to a protocol based on the AOFAS (Smith et al 1984) and re-assessed at three-monthly intervals. Pain improved from 23 ± 5.2 to 36 ± 5 on final follow up (max 40). Functional score improved from 31 ± 4.1 to 42 ± 1.2 and alignment score from 3 ± 2.3 to 16 ± 2.4 on final follow up. Overall AOFAS score improved from 58 ± 1.6 to 94 ± 8.6 . Radiographic results of the procedure were also satisfactory. Preoperatively the Hallux valgus angle was 30.3 ± 7.1 degrees which improved to 11.1 ± 4.9 degrees on final follow up. The Inter metatarsal angle also improved from a preoperative score of 15.7 ± 2.9 to 7 ± 2.0

Conclusion: Mitchell's procedure is simple, cheap and can safely address the hallux valgus deformity with good postoperative function results, both clinical and radiological. Osteotomy is stable and avascular necrosis can be easily avoided by careful soft tissue handling.

Keywords: Hallux Valgus, Mitchell's osteotomy, 1-0 Vicryl

INTRODUCTION:

Hallux valgus is the one of the commonest forefoot deformities. Apart from cosmetic perspectives it can be problematic because of its pressure effects. Though common in the age group of 30-60s in females of shoe wearing population, It's incidence in general population is also increasing.[1] It is defined by medial angulation of the first metatarsophalangeal joint with respect to great toe. Soft-tissue enlargement may or may not be present. [2]

Many procedures have been documented in literature to correct such deformity including soft-tissue procedures, osteotomies of proximal or distal metatarsal region. Also the procedures like resection arthroplasty and arthrodesis are well described in literature. [3-17]

Mitchell's osteotomy is one of the treatment options for such deformity and was made popular by Mitchell himself after his experience on 400 feet's. [9] He Suggested a double osteotomy through the neck of first metatarsal in which the distal fragment is displaced medially and planter-wards aiming to

restore the load-bearing function of the feet.[18] Metatarsalgia due to lateral weight transference and malunion of head are the two main issues regarding this osteotomy. Internal fixation with screws, miniplates or 1-0 vicryl are the established methods of fixation.[19-22] The former has associated complications like pain at the screw head, need of second surgery for hardware removal while as the vicryl fixation as described by the Mitchell needs a proper postoperative care to prevent failure. We performed this classical Mitchell's procedure on 40 feet's and present our observations after the mean follow up of 6 years.

MATERIAL AND METHODS

Thirty patients with ten bilateral feet's of hallux valgus deformities were operated at Bone and Joints hospital between the years 2007-2012. We had 23 females and 7 male patients with all the bilateral cases being females. The age group was between 19 years to 35 years. Four female patients had positive family history. The follow up period was between 2 years to 7 years. All the patients were examined by

at-least two surgeons before the surgery. The pre-operative radiograph of Antero posterior view was taken and recorded. The indications for surgery included pain, difficulty in foot wear and cosmesis. [Figure1, 2,]

The radiograph only was not the criteria for the surgery.

Operative technique:

Although various approaches for the the first metatarso phalangeal joint have been described in literature, we used the dorso medial approach over the first MTP joint extending from middle of proximal phalanx to the 3 cm proximal to MTP joint coursing around the bunion.

Capsule was incised by Y-shaped incision. Lateral capsule was left intact as this may compromise the blood supply of head of metatarsal.

Double step cut osteotomy was performed after marking two holes, The first one 1.5 cm proximal to the articular surface of the metatarsal head and towards its medial cortex and the second hole was drilled 1 cm proximal to the first hole on the lateral cortex. A 1-0 Vicryl was passed through the hole and tied dorsally after the osteotomies. [Figure 3]

First osteotomy was incomplete marked 3-4mm proximal to distal hole and the second complete one was made 4 mm proximal to the first cut. 3-6 mm of lateral spike was left intact (depending upon the correction required)

After removing the intervening bone, the capital fragment was shifted laterally. Suture was tied while keeping the fragment in 10 planter flexion.

Displaced fragment was flushed with the rest of the metatarsal and projections were resected. Capsule was tightened while keeping the toe in as anatomical as possible. [Figure 4]

POSTOPERATIVE CARE

Following surgery, we gave a short plaster boot cast for two weeks. Sutures were then removed and a short leg cast was given and patient allowed to bear weight partially. Four weeks after surgery, full weight-bearing was started. Patients were followed up on outpatient basis and the post-operative X-rays were taken and the questionnaire was recorded.

Regular follow up period ranging from 2 to 7 years (average 5 years) was maintained. Besides Radiographic assessment for metatarsal phalangeal angle, intermetatarsal angle and metatarsal shortening, other parameters like pain, appearance, shoe modification, metatarsalgia were also recorded. [Figure 5]

We recorded our preoperative scoring as per AOFAS and then at final follow up. The 100 points of AOFAS are divided between pain (40), function (45) and alignment (15). Subjective scoring was

graded as per satisfaction: ‘‘very satisfied, satisfied, improved and dis-satisfied’’

Radiographic assessment was done for hallux valgus angle and first-second metatarsal angle. Since the modern soft-wares are not available at all orthopaedic centres like ours, we measured the angles manually by markings on the X-ray films. Hallux valgus angle was measured by drawing a line along the diaphysis of proximal phalanx of the great toe and along longitudinal axis of first metatarsal.

The first-second metatarsal angle is formed by intersection of lines along the diaphysis of first and second metatarsals.

AOFAS score	Preoperative	Final follow up
Pain	23 \pm 5.2	36 \pm 5
Function	31 \pm 4.1	42 \pm 1.2
Alignment	3 \pm 2.3	16 \pm 2.4
Total	58 \pm 1.6	94 \pm 8.6

RESULTS:

Thirty (23 females with 10 bilateral feet's and 7 male) patients of hallux valgus deformities were operated at Bone and Joints hospital between the years 2007-2012. The age group was between 19 years to 35 years. Four female patients had positive family history. The follow up period was between 2 years to 7 years.

All patients were assessed according to a protocol based on the recommendations of the American Orthopaedic Foot and Ankle Society AOFAS (Smith et al 1984) [23] and re-assessed at three-monthly intervals. (Table 1)

The common complaint among the patients before surgery was either painful bunion or the first metatarsophalangeal joint. All patients had a conservative trail before being taken up for the surgery.

The reasons for the surgery are given in the table 2

Parameter	Number of feet's	Number of patients
Pain	35 feet's	27 patients
Foot wear problems	30 feet's	24 patients
Cosmetic	5 feet's	3 patients

The pain was relieved in 24 patients completely while as 2 patients had some pain. One patient complained of persistent pain. All the patients were satisfied with the cosmetic results and only one had problems with the shoe wear.

So far AOFAS score is concerned pain improved from 23 \pm 5.2 to 36 \pm 5 on final follow up (max 40).

Functional score improved from 31 ± 4.1 to 42 ± 1.2 and alignment score from 3 ± 2.3 to 16 ± 2.4 on final follow up. Overall AOFAS score improved from 58 ± 1.6 to 94 ± 8.6 .

Radiographic results of the procedure were also satisfactory. Preoperatively the Hallux valgus angle was 30.3 ± 7.1 degrees which improved to 11.1 ± 4.9 degrees on final follow up.

The Inter metatarsal angle also improved from a preoperative score of 15.7 ± 2.9 to 7 ± 2.0 .



Fig. 1: pre-operative picture of hallux valgus



Fig. 2: Medial approach and calculation of distance from the articular surface for the double step osteotomy



Fig. 3: Position of proximal and distal holes



Fig. 4: Correction achieved



Fig. 5: Pre op X ray and Final x-ray showing well united osteotomy with correction of hallux valgus.

DISCUSSION

Hallux valgus deformity correction has seen many changes since it was first documented by Reverdin Who did osteotomy. [6] Since then various procedures have been documented in literature which include soft tissue procedures and bony procedures. Soft tissue procedures address majority of the problems but the recurrence rates are high to make them the treatment of choice or the first option in all cases. The bony procedures have been documented with varying results. Proximal and distal first metatarsal osteotomies have shown promising results but opinions by various authors vary regarding the procedures and the complications. Also the use of stabilising agents for the osteotomy has been the matter of discussion. The metallic hardware used by many authors had the complications of impingement, pain and necessity of second surgery for removal. The approach to the metatarso-phalangeal joint via medial Trans articular and first web space was also recently compared without much significant differences.

We followed the medial approach and used 1-0 vicryl for stabilising the osteotomy. Same method was used by various authors.

Analysis of various parameters:

Pain was the major complaint among the patients and 24 patients had complete pain relief on the final follow up, two patients had some pain and only one patient complained of the persistent pain. This was consistent with other studies. In a study of 91 Mitchell osteotomies, in which painful bunion justified

Surgery in 92% of patients, Desjardins et al. [24] achieved satisfactory improvement of pain in 92% of patients. Oye and Finsen [25] had alleviation of pain in 35 patients of the total of 44 patients who underwent Mitchell's osteotomy. Dermon et al., [26] followed 51 feet with Mitchell's osteotomy

For 10 years and had a satisfactory result in 90% patients. However, they noted a loss of 5° in the hallux valgus angle over the period.

Five feet's of three patients were operated for the cosmetic reasons and all were satisfied with the results. Mention is made about two bilateral cases of two sisters who were females and first patient was so satisfied about the results that she counselled her sister for the surgery. Overall all but one patient of the series was satisfied cosmetically with the results. Merkel [27] followed 96 patients over a period of seven years and 86% of these patients were satisfied with the cosmetic outcome of the surgery. Glynn [28] reported good or excellent results in 92% patients. Tan *et al.* [29] followed 55 Mitchell's osteotomies and 92% of patients were satisfied with the results of the procedure.

Radiographic correction was from the hallux valgus angle of 30.3 ± 7.1 degrees which improved to 11.1 ± 4.9 degrees on final follow up.

The Inter metatarsal angle also improved from a preoperative score of 15.7 ± 2.9 to 7 ± 2.0

Tan *et al.* [29] achieved hallux valgus correction of 18.7° and intermetatarsal angle correction of 6.2° . Most of the authors have reported a correction of 10° . 25° , 20° , 22° - 24° in hallux valgus and 5° . 10° , 9° , 22° - 24° in intermetatarsal angles.

Metatarsal shortening is found in majority of cases after Mitchell's procedure. We had measured the shortening of 7.3 ± 2.2 mm.

Metatarsalgia was seen in six patients and all the six had the metatarsal shortening of more than 9mm. Whether shortening is related to the metatarsalgia is a debatable issue. [19, 30, 31]

Another complication associated with the procedure is avascular necrosis of the metatarsal head. This was avoided in our series by doing very little lateral soft tissue dissection.

Functional score improved from 31 ± 4.1 to 42 ± 1.2 and alignment score from 3 ± 2.3 to 16 ± 2.4 on final follow up. Overall AOFAS score improved from 58 ± 1.6 to 94 ± 8.6 . This was consistent with the study conducted by various authors but a direct comparison is not possible because various studies have used different scales for post-operative assessment. Our results are comparable with the results of Mitchell, Kinnard et al [9, 32]

CONCLUSION

Mitchell's procedure is simple, cheap and can safely address the hallux valgus deformity with good postoperative function results, both clinical and radiological. Osteotomy is stable and avascular necrosis can be easily avoided by careful soft tissue handling .patients should be informed about post-operative metatarsalgia.

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