Ortopedia Traumatologia Rehabilitacja
© MEDSPORTPRESS, 2012; 1(6); Vol. 14, 55-60
DOI: 10.5604/15093492.976901

The Gibson and Piggott Osteotomy for Adult Hallux Valgus

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SUMMARY

Background. The Gibson and Piggott procedure for hallux valgus is based on sound surgical principles addressing the basic pathologies of this disorder. However, this procedure has not been studied extensively in the literature in comparison to the Mitchell and Chevron osteotomies.

Material and methods. We report a prospective study conducted on 50 adult feet with hallux valgus. The Gibson and Piggot osteotomy was done on all the feet.

Results. We obtained 76% excellent and 18% good results with this procedure.

Conclusion. The results bear out the fact that this procedure is a useful procedure for the management of this disorder.

Key words: hallux valgus, Gibson and Piggot osteotomy

BACKGROUND

A large number of osteotomies have been described for the correction of hallux valgus indicating that no osteotomy is universally acceptable and many have serious shortcomings. From the time of Reverdin in 1881, the benefits of metatarsal osteotomy have been emphasised in literature [1,2].

Over a period of time, several modifications of the original surgical procedures for hallux valgus have been developed to better address the underlying etiopathology. Some of these techniques have been studied threadbare. This includes the Mitchell and the Chevron osteotomy [3,4], while literature regarding some of the other equally technically adequate procedures is surprisingly scarce.

The purpose of this study is to report the results of an extensive prospective assessment of the Gibson and Piggott peg in the hole osteotomy for the management of the adult Hallux Valgus.

METHODS

The study was conducted prospectively on a total of 50 feet, who presented to the outdoor department of our hospital, with Hallux Valgus from 2001 to 2005. Patients with a Hallux Valgus angle of 20 degrees to 44 degrees, a first–second intermetatarsal angle of less than 16 degrees and a >50% subluxation of the lateral sesamoid were included. These are the parameters within which the metatarsal osteotomy is considered as the treatment of choice and additional procedures are not required.

Patients with metatarsalgia and compromised neurovascular status of the foot were excluded.

All patients underwent the radiographic work-up as described by Hardy and Clapham [5].

Technique

Through a longitudinal dorsomedial incision, the neck of the first metatarsal bone is exposed subperiosteally and divided, just proximal to the joint capsule. The cortex of the proximal segment is trimmed so as to leave a stout lateral spike about 3/8 of an inch (6-7 mm) long and nearer the plantar surface than the dorsal. The metatarsal head is then impacted on to the spike with the toe in the neutral position and this may be facilitated by boring a small hole in the distal fragment. The tendon of the external hallucis longus is centralised by dissecting it free and allowing it to fall into its new position. This reduces the bowstring effect.

Tissue tension and invagination at the docking site is enough to stabilise the osteotomy and internal stabilisation is not required in a properly done surgery.

Post-operative management and follow-up

Three short plaster of Paris slabs are applied to support the osteotomy, on three sides. A boot cast is then completed.

Stitches are removed at 3 weeks. Below knee cast is applied and weight bearing advised. Cast removal is done at 6 weeks. Final assessment is done at 1 to 5 years post-operatively.

Assessment was done as per the criteria laid down by Gibson and Piggott. Radiologic assessment was done as per the criteria of Terzis et al [6,7] and final assessment done as per the method of Bonney and Macnab.

RESULTS

The age of the patients ranged from 20–63 years with a mean of 26.5 years. There were 29 males and 11 females, with left foot alone being involved in 18

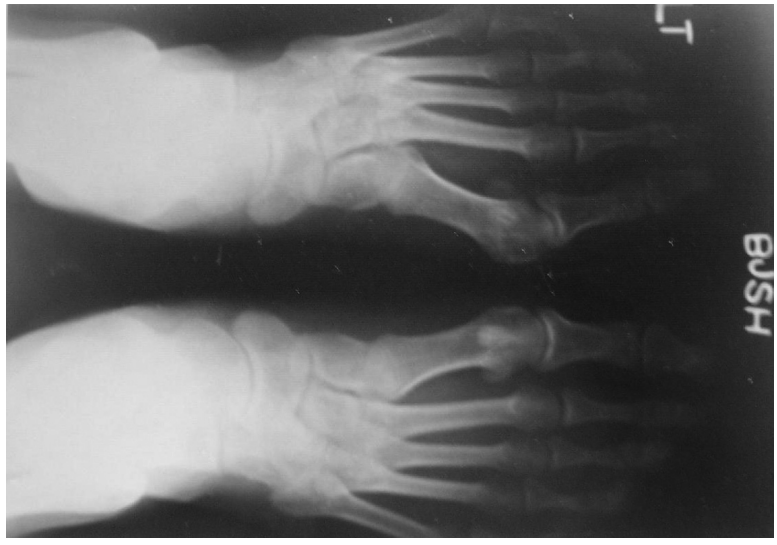

Fig 1. Radiograph showing the hallux valgus of the left foot

and right alone in 12. The presentation was bilateral in 10 cases. 94% of the patients presented with a complaint of deformity and 93% with pain over the bunion, 78% reported difficulty in shoe wear and 56% had an overriding 2nd toe. 32% of our patients had a positive family history. Most of our patients had square feet. No Grecian feet were included. The mean duration of symptoms in our patients was 6.2 years with a range of 1-12 years.

The mean hallux valgus angle was 34.75 degrees preoperatively, decreasing to 17.72 degrees at final assessment and the mean intermetatarsal angle was 12.26 degrees, decreasing to 11 degrees at final follow up. The preoperative forefoot width averaged 9.76 cm and decreased by an average of 8 mm. The average shortening in our series was 7.1 mm on comparison of the preoperative radiographs with the postoperative ones. In 80% feet the congruence improved.

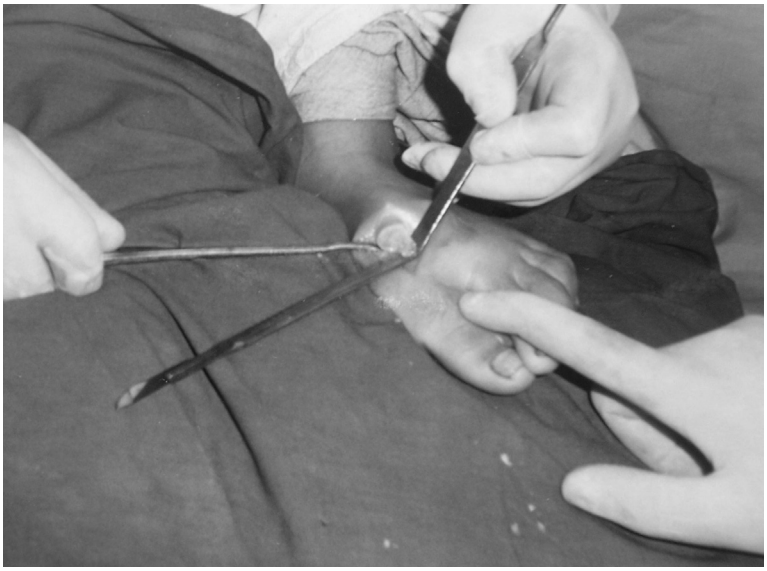

Fig. 2. Intraoperative photograph showing the plantar lateral peg

Fig. 3. The postoperative radiograph

Fig 4. Final radiograph showing a maintained correction in the AP plane

Fig 5. Oblique view showing the angulation that prevents transfer metatarsalgia.

Four feet developed metatarsalgia at final follow-up. Minor complications like superficial infection developed in 6% and were managed conservatively. Angulation at the osteotomy site occurred in 2 feet.

A final assessment was done at an average of 3 years by the Bonney and Macnab criteria. On this basis we had 76% excellent and good results, 18% fair and 6% poor results.

DISCUSSION

Historically, distal osteotomy is used for deformities that are mild. The deformity of Hallux Valgus is associated with three basic problems: a prominent medial eminence, contracted soft tissues on the lateral side of the great toe and an altered intermetatarsal angle between the first and second metatarsals [8]. Choosing a procedure that can correct the basic etiology of the hallux valgus easily is better than stretching the indications of a less intensive procedure. The goal of an adequate surgery is to maintain a flexible first metatarsophalangeal joint, preserve the normal weight bearing pattern of the forefoot and retain a reasonable means of salvage should a complication occur.

More than 130 operative procedures have been mentioned for the treatment of hallux valgus [9]. Faced with such a variety of surgical procedures the uncommitted surgeon could find the choice of operation difficult [10]. Metatarsus primus varus as one of the more important preexisting causes for hallux valgus has been highlighted by Truslow and elucidated in further studies [10,11].

The distal metatarsal osteotomy is well documented as being a reliable method of treating hallux valgus with metatarsus primus varus [2,12].

Amongst the osteotomies used at the distal end of the metatarsal, the Wilson procedure, the Mitchell procedure and the Chevron procedure have been studied and reviewed in excellent papers [3,10]. Helal described the Wilson osteotomy as a consistently reliable operation [10]. However complications like the avascular changes of the metatarsal head, arthofibrosis of the metatarsophalangeal joint and inability to correct pronation of the great toe have been reported pertinently with these procedures [13,14].

These complications occur in addition to the known complications of non-union and loss of reduction.

According to Turnbull et al, loss of alignment is less likely and union quicker if osteotomy is made through cancellous bone at the base of the metatarsal head [12]. Peabody noted that a prescribed bone spicule assisted in preventing horizontal shifting of the fragments [15].

The peg in hole osteotomy allows lateral shift of the distal fragment without compromising the stability. The long peg ensures stability. A possible long-term complication of this osteotomy would be the occurrence of transfer metatarsalgia. Plantar shift allows the first metatarsal to continue bearing weight without causing the metatarsalgia. Union is rapid due to the cancellous area of the osteotomy. In comparison, the Mitchell procedure does not allow plantar shift of the fragment.

Magnan et al used a distal osteotomy for 118 feet. They reported a recurrence rate of 2.5% [16].

Crevoiser et al did Scarf osteotomy in 71 patients. They reported 89% satisfaction rate. However 9 patients required additional procedures. Coetzee reported a high rate of complications [17,18].

The Chevron osteotomy is highly recommended but is not free of complications. Meier et al reported an osteonecrosis rate of 20% [19].

Fokter et al reported a deterioration in results of the Mitchell osteotomy on long term follow up in 33% patients [20].

Szudy et al reported the results of the Dega osteotomy. The clinical and X-ray examination found good results in 29% of cases, fair results in 59% and poor results in 12% of cases. Fair results were associated with persistent wide forefoot and shortening of first metatarsal bone. Poor results were associated with persistent valgus deformity of hallux. They reported shortening of the first metatarsal bone of more than 1 cm in several cases [21].

CONCLUSIONS

Our study proves that the Gibson and Piggot osteotomy is a good procedure in the management of hallux valgus in addition to producing the following advantages inherent to the technique:

1. Reduction of the arthofibrosis in view of the extraarticular nature of the procedure.
2. Reduced incidence of AVN.
3. Stability due to the peg. In comparison, the stability in Chevron type is augmented by bioabsorbable pins and plates may be required to stabilise some of the other osteotomies. The design of the peg is such that the stability is ensured without the requirement for fixation.
4. Reduction of the transfer metatarsalgia due to the plantar shift of the distal fragment.

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Liczba słów/Word count: 2141 **Tabele/Tables:** 0 **Ryciny/Figures:** 5 **Piśmiennictwo/References:** 22

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Otrzymano / Received 17.02.2011 r.
Zaakceptowano / Accepted 20.07.2011 r.