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ORIGINAL STUDY

Surgical treatment of hallux valgus : the Gibson-Piggott technique revisited

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More than 130 surgical procedures have been described to treat hallux valgus deformity. The "spike" first distal metatarsal osteotomy was first described by Gibson and Piggott in 1962. Despite having the advantage of using only patient's "material", this technique has been abandoned by most orthopaedic surgeons,due to fear of complications such as breaking of the bony peg and loosening of fixation at the osteotomy site.

A group of surgeons at our hospital have performed 422 Gibson-Piggott procedures between 1985 and 2005 with consistently good results. This fact convinced us to "revisit" the procedure.

Thirty seven consecutive patients (43 feet) who had surgery between July 2000 and December 2002 were randomly selected as "sample". A Questionnaire based on the American Orthopaedic Foot and Ankle Society (AFOS) Score was used for evaluation. Thirty three patients (36 feet), i.e. 89% responded to our survey. Average follow-up after surgery was 47 months (between 31 and 63 months).

Results showed that 30 patients (91%) had no or only mild pain, 29 patients (88%) had no or only slight limitation in activities of daily living and 31 patients (94%) were able to use fashionable or comfortable shoes with no problems. When using numerical evaluation, 28 patients (85%) scored 65 or more points (from a total of 95 points), representing a good postoperative result, comparable with other "modern" distal metatarsal osteotomies. In conclusion, the Gibson-Piggott procedure was shown to be a valuable technique in the treatment of mild or moderate hallux valgus deformity.

Keywords : hallux valgus ; surgical treatment ; metatarsal osteotomy ; Gibson-Piggott technique.

INTRODUCTION

Hallux valgus, or excessive lateral deviation of the big toe, is one of the most commonly encountered foot conditions. It can occur in adolescents, but predominates in adults and older people, being more frequent in women (*7*).

The patient usually complains of pain over the "bunion" (protuberance of the first metatarsal head exostosis on the medial side of the foot), pain under the heads of the other metatarsals, difficulty in wearing shoes and unsightly appearance of the foot.

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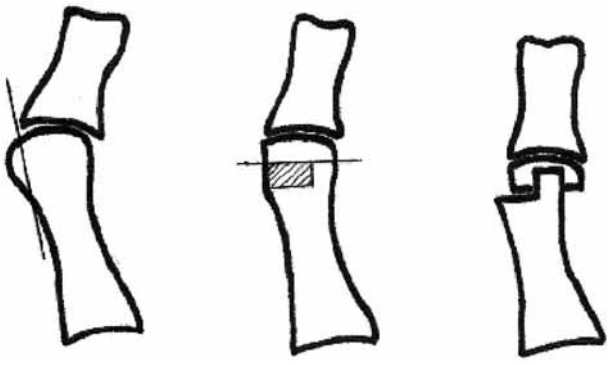

Fig. 1. — Schematic representation of the Gibson-Piggott distal metatarsal osteotomy.

The initial management of hallux valgus must be conservative, with advice to wear wider shoes with a broader toe box or different types of orthoses. Analgesics can also be prescribed. When this treatment fails, the next option is surgery.

More than 130 surgical procedures have been described in the orthopaedic literature (*5*). Amongst these, distal osteotomy of the first metatarsal with or without soft tissue procedure remains the most popular (*2, 7*). As a principle, however the osteotomy is done, the aim is to displace the head of the first metatarsal lateral and slightly plantar (after excision of the bunion) in an attempt to correct the deformity but, at the same time, to maintain normal foot biomechanics (*3, 8, 9*).

The "spike" distal osteotomy of the first metatarsal was described by Gibson and Piggott in 1962 (*3*). They had 80% good and satisfactory results after reviewing 82 operated feet. They emphasised the importance of a plantar-lateral position of the bony peg and avoidance of technical errors such as dorsal angulation or inadequate lateral displacement of the distal fragment. This procedure has the advantage of using only patient "material" and does not require any metallic or suture fixation at the level of osteotomy (fig 1).

A group of orthopaedic surgeons at our hospital have performed 422 Gibson-Piggott procedures between 1985 and 2005 with consistently good results. A group of 37 consecutive patients who had surgery between 2000 and 2002 was taken as a random "sample".

The purpose of our study is to show that, despite fears by many regarding the possibility of peg breakage or instability at the osteotomy level, the Gibson-Piggott osteotomy, when appropriately performed in well selected cases, remains a valuable technique which can give a high level of patient satisfaction. Few reports could be found in recent journals referring to this method (*10*).

PATIENTS AND METHODS

From July 2000 to December 2002, 37 patients (43 feet) with mild to moderate hallux valgus deformity were operated using the Gibson-Piggott technique at George Eliot Hospital, Nuneaton, United Kingdom. Thirty three patients (36 feet), i.e. 89% answered to our retrospective survey. There were 31 females (94%) and 2 males (6%), with ages between 24 and 85 years (average 55 year-old). The follow-up after surgery was between 31 and 63 months, with an average of 47 months.

From patients' notes we found that in all patients the main complaints were pain over the "bunion" and difficulty in wearing comfortable shoes. These complaints were significant enough to interfere with normal daily employment or recreational activities, and therefore warranted some form of treatment. In all patients conservative management was tried before surgery. The AP (antero-posterior) and lateral standing views were checked before surgery to assess hallux valgus angle (HV angle), congruency of the first metatarso-phalangeal joint (MTP joint) and the intermetatarsal angle between the first and second metatarsals (IMT angle). Only patients with mild (HV angle 15-20°and IMT angle 9-11°) or moderate (HV angle 20-40° and IMT angle 11-18°) hallux valgus were selected for the Gibson-Piggott procedure. Patients with first MTP joint osteoarthritis or severe first MTP joint incongruency were excluded.

The technique was performed as described by Gibson and Piggott in 1962 (*3*). A 10-mm blade osteotome was used. The hole in the metatarsal head was designed to be oval, to assure more stability of fixation. Also the peg was prepared in such way to have straight and not oblique margins, to fit better in the metatarsal head hole. The stability was clinically checked at surgery by flicking the big toe and observing if the fixation was unstable. We considered that, if the peg disengaged when

Fig. 2a. — Preoperative radiograph

Fig. 2b. — Postoperative radiograph

flicking the big toe, the fixation was not stable. In patients with an incongruent MTP joint, a medial capsule imbrication by Y or V- capsulorrhaphy was performed in addition to osteotomy.

A typical example is shown in fig 2 a-b. Postoperatively strips of plaster in figure of eight around the first MTP joint strengthened by dorsal and plantar plaster strips were used for 2 weeks. A "plaster" shoe was used and the patient was allowed to heel walk. At 2 weeks initial immobilisation was removed and a plaster bootee was applied for another 4 weeks, and heel walking was encouraged. At 6 weeks, the bootee was removed and the patient was allowed to walk on the sole. Special attention was paid to encourage the patient to walk properly on the sole to avoid the reflex/natural tendency to walk on the lateral side of the foot, thereby decreasing the chances of metatarsalgia. Comfortable footwear was advised. The patients were usually seen after another 6 weeks for the final check-up.

Satisfaction of patients with this method was checked by a Questionnaire (table I) derived from the AOFAS Hallux Metatarsophalangeal-Interphalangeal Scale (6). Foot pain (mainly at the level of the big toe), function after surgery (including capability of wearing shoes) and subjective evaluation of the big toe alignment were assessed. All of these are strongly correlated with patient satisfaction, since these factors represent the reason why the patients are looking for surgery. A numerical calculation to find out the total score for each patient was also done, considering a total of 40 points for pain, 40 points for function (we excluded the 5 points given for callus assessment at the level of osteotomy since this is mainly not clinical interpretation) and 15 points for big toe alignment, giving a total of 95 points. A score more or equal to 65 points was considered to be a good clinical result.

RESULTS

At the 47 months average follow-up, 17 patients (52%) had no pain at all, 13 patients (39%) had only mild pain, 1 patient (3%) had moderate pain and 2 patients (6%) severe pain (fig 3). Overall, 30 patients (91%) had no or only mild pain at the date of the survey. There were no differences in result of surgery between one foot and the other in our 3 patients with bilateral surgery. Therefore, we evaluated "patients" and not "feet".

Function of big toe/foot was analysed with respect to limitation of daily activities, footwear requirements, movement at the level of the first and second joint and stability of the first joint of the big toe. Twenty three patients (70%) had no limitations of activities, six (18%) had only slight limitation related to occupational or recreational activities, 3 (9%) had limited daily activities and only one (3%) had severe limitation of daily and recreational

Table I. — Questionnaire for postoperative hallux valgus assessment (adapted after AOFAS scale for hallux valgus)

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1	**Do you experience pain in your foot ?**	**YES** ☐ **NO** ☐	-40 points
1a	**If yes, is it** (Please tick one)		
	☐ Mild, occasional		-30 points
	☐ Moderate, daily		-20 points
	☐ Severe, almost always present		-0 points
2	**In terms of activity, which of the following would apply to you ?** (Please tick one)		
	☐ No limitations at all		-10 points
	☐ Slight limitations, eg employment responsibilities, recreational activities		-7 points
	☐ Limited daily and recreational activities		-4 points
	☐ Severe limitation of daily and recreational activities		-0 points
3	**What are your footwear requirements ?** (Please tick one)		
	☐ Fashionable, conventional shoes, no insert required		-10 points
	☐ Comfort footwear with shoe insert		-5 points
	☐ Modified shoes or brace		-0 points
4	**Is your big toe movement limited ?** (Please tick one in each section below)		
	First joint *of big toe (bending and straightening)*		
	☐ Normal or mild restriction		-10 points
	☐ Moderate restriction		-5 points
	☐ Severe restriction		-0 points
	Second joint *of big toe (bending motion only)*		
	☐ No restriction		-5 points
	☐ Severe restriction		-0 points
5	**Do you ever feel that the first joint of your big toe is going to dislocate** (Please tick one)		
	☐ No		-5 points
	☐ Yes		-0 points
6	**Is your big toe well aligned ?** (Please tick one)		
	☐ Yes, big toe well aligned		-15 points
	☐ Maybe, some degree of big toe malalignment observed, no symptoms		-8 points
	☐ No, obvious malalignment with symptoms		-0 points

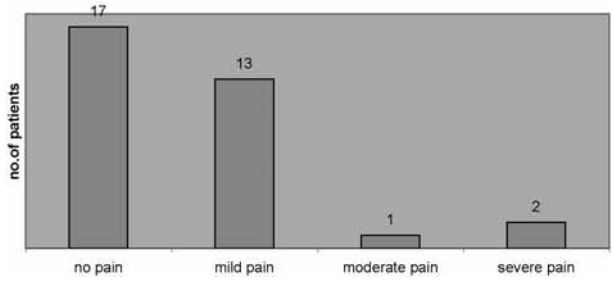

Fig. 3. — Pain after Gibson-Piggott procedure

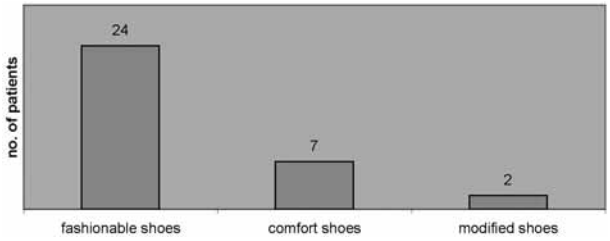

Fig. 5. — Footwear requirements after Gibson-Piggott procedure.

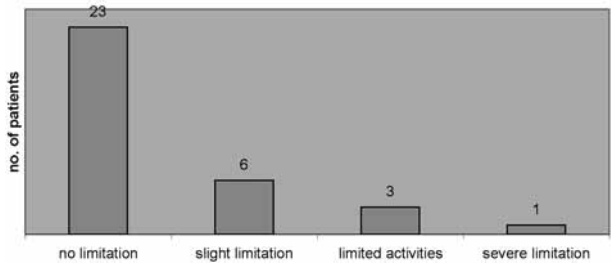

Fig. 4. — Function limitation after Gibson-Piggott procedure

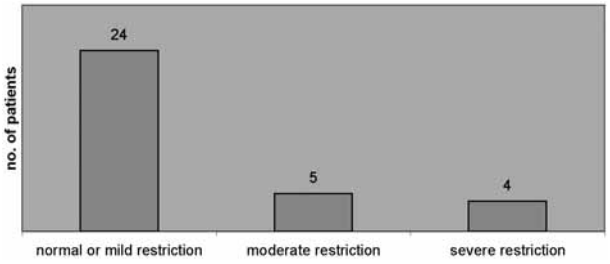

Fig. 6. — Big toe movement after Gibson-Piggott procedure

activities (fig 4). Overall, 29 patients (88%) had no or only slight limitations in their activities (occupational or recreational activities).

With regard to shoe wearing after surgery, 31 patients (94%) had no special problems and only 2 (6%) were wearing modified shoes at the date of the survey (fig 5).

Only one patient complained that the MTP joint of the big toe was unstable.

Mobility of the big toe was unchanged in 24 patients (73%) at the level of the MTP joint and in 27 patients (82%) at the level of the interphalangeal joint (fig 6).

With regard to alignment of the big toe, 17 patients (52%) answered "yes" for good alignment, 16 patients (49%) answered "yes" for some degree of malalignment but with no symptoms, and none of the patients ticked "yes" for major malalignment. This made the conclusion of 33 patients (100%) with no obvious malalignment.

When calculating the total score for each patient, 28 patients (85%) scored 65 or more points, representing a good postoperative result.

DISCUSSION

Distal metatarsal osteotomy is the commonest surgical method used for treatment of hallux valgus deformity (*2, 7*). Mitchell's and chevron osteotomy, as described originally or slightly modified, are most mentioned in orthopaedic journals nowadays (*4, 8, 11, 12*). Gibson and Piggott described the "spike" distal osteotomy of the first metatarsal in 1962 (*3*). However, it seems that this procedure did not gain much popularity, probably because it was associated with a fear of complications such as breaking of the bony peg and loosening of fixation at the osteotomy site.

We "revisited" the technique and found that, as mentioned by its authors, when properly performed in properly selected cases, the results could be rewarding. Since patient satisfaction is paramount for any treatment, we investigated this using a Questionnaire based on the AFOS Hallux Metatarsophalangeal- Interphalangeal Scale (*6*). In the Scale/Questionnaire are included the reasons why patients usually seek help from the orthopaedic

surgeon : pain, limitation in normal activities and cosmetic appearance of the foot.

The Questionnaire was used only at the date of our survey (on average 47 months after surgery) and not prior to surgery. However we operated only on patients with significant symptoms interfering with normal daily occupational or recreational activities. We accept that in this situation we are unable to calculate if our results correspond to statistically significant improvements. However, around 90% of our patients were satisfied with the operation.

Thus, thirty among 33 of our patients (91%) had no or mild pain at an average follow-up of 47 months after the procedure. Twenty-nine patients (88%) had no or slight limitation of their activities, e.g. employment responsibilities or recreational activities, and 31 patients (94%) were able to wear fashionable or comfortable shoes with no problems. When the numerical calculation has been done, 28 patients (85%) scored 65 or more points.

We have been careful in the selection of patients for this procedure (only patients with mild or moderate hallux valgus, no hallux rigidus and only mild first MTP joint incongruity were selected) and we also tried to avoid technical errors related to dorsal angulation, inadequate lateral displacement of the distal fragment or excessive shortening of the great toe, especially in patients with congenital "length discrepancy" between first and second metatarsal. The satisfaction of our patients is comparable with results of other commonly performed distal first metatarsal osteotomies *(4, 9)*. Reduction in movement of the joints of the big toe was the most common cause of dissatisfaction in our patients, with 7 patients (21%) having moderate to severe restriction. All of these experienced pain : 2 of them (6%) severe, 4 (12%) mild and occasional and 1 (3%) moderately. It seems that stiffness could be related to the operation as mentioned also by Gibson and Piggott in their original article *(3)*. However, other procedures are known to have the same effect *(2, 4, 8, 9, 10)*.

In conclusion, the Gibson-Piggott technique still appears to be a valuable procedure for the treatment of mild to moderate hallux valgus deformity.

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