G. Monteleone · M. Vigilante · C. Mazzotta
M. Monteleone

The Viladot-Regnauld operation for hallux valgus

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Abstract Of 54 patients, we reviewed 26 with 28 operations for hallux valgus according to the Viladot-Regnauld technique. Follow-up was 18.7 (12–26) years. In 26 operations, the score according to Kitaoka and modified by Calder was excellent or good, and in two, fair. There were no complications. Average valgus angle correction was 15° (8° – 29°) and average intermetatarsal angle correction was 7° (4° – 12°). Sesamoids were medialised, on average, by at least 25% compared to the pre-operative situation. The results confirm the validity of this surgical procedure.

Résumé A partir de 54 malades nous en avons examiné 26 après 28 opérations pour hallux valgus selon la technique de Viladot-Regnauld. Le suivi était 18.7 (12–26) années. Dans 26 opérations le score de Kitaoka modifié par Calder était excellent ou bon, et moyen dans 2 cas. Il n’y avait pas de complications. Il y avait un angle moyen de correction du valgus de 15° (8° – 29°) et un angle moyen de correction intermétatarsienne de 7° (4° – 12°). Les sésamoids se sont trouvés médialisés d’au moins 25% en moyenne par rapport à la situation pré-opératoire. Les résultats confirment la validité de cette technique chirurgicale.

Introduction

Hallux valgus is a common foot deformity whose pathogenesis often is linked to the use of inadequate footwear by pre-disposed persons [2, 4, 7, 10]. Effectiveness of conservative therapy in correcting and limiting the evolution of this deformity is low [7]. Simple and effective surgery that exposes the patient to the smallest possible

risk of complications (that may prove more invalidating than the pathology itself) is, in our opinion, the primary goal. Eliminating the deformity by an operation combining action on soft tissue as described by Viladot (repositioning of sesamoids) [10], with osteotomy and re-insertion of the basal portion of the proximal phalanx after remodelling according to the Regnauld technique [9], gives excellent and lasting results.

In this study, we reviewed clinical, radiographic, and podoscopic results in a group of patients treated by this technique.

Patients and methods

The study involved 54 subjects who were operated by the same surgeon (MM) from 1975 to 1988 for correction of hallux valgus by the Viladot-Regnauld technique. The only indication taken into account was hallux valgus, with no distinction as to gender, age, or seriousness of the deformity in the absence of grave arthritic degeneration. In bilateral pathology, the operation was performed in sessions separated by some months.

Of the original group, we assessed 26 subjects (12 patients were not available for follow-up and 16 had died from old age or intervening illness) – 18 women and eight men, two of whom were operated bilaterally. Time since operation was, on average, 18.7 (12–26) years. Average age at time of operation was 49.2 (33–65) years. Follow-up was done from October 2000 to September 2001, and patients underwent clinical, radiographic, and podoscopic examinations.

For assessment of results, in addition to considering patient satisfaction, we employed the scorecard developed by Kitaoka [6] and modified by Calder [1], which takes into account the degree of pain: none (30), mild (20), moderate (15), and severe (0); any functional or footwear limitations: none (15), mild (10), moderate (5), and severe (0); the presence/absence of hyperkeratosis (0/10); the presence/absence of acceptable alignment (5/0); and the presence/absence of rigidity (0/5). Scores of 70–75 were considered excellent, 60–70 good, 50–60 fair, and less than 50 poor.

Radiographic examination concerned the dorsal plantar and lateral projections under weight load, performed bilaterally in all cases. Pre-operative valgus angle of the first phalanx, and the intermetatarsal angle (or varus angle of the first metatarsus) was compared with those calculated on the long-term follow-up radiograms.

G. Monteleone (✉) · M. Vigilante · C. Mazzotta · M. Monteleone
Dipartimento di Chirurgia, Sezione di Ortopedia e Traumatologia,
Università degli Studi di Roma “Tor Vergata”, Via di Tor Vergata,
135, 000133 Rome, Italy
e-mail: Giovanni.monteleone@uniroma2.it
Tel.: +39-06-72596686, Fax: +39-06-20427294

Surgical technique

A rectilinear incision about 4 cm is made at the dorsal medial cutaneous projection of the metatarsal-phalangeal joint of the first toe. The capsule is incised and adhesences are removed over the entire circumference, checking to ascertain mobilisation of the sesamoids. The phalanx is dislocated medially. Following the Regnaud method [9], the phalanx is transected in the diaphysis between the proximal third and the distal two thirds, and the medullary canal of the distal part is enlarged. The distal end of the proximal part is fitted into the medullary canal of the distal part (Fig. 1). The non-articular medial portion of the first metatarsal head, and any exostosis, is resected. The varus of the first metatarsus is corrected with one hand, taking care to detach all of the periosteum with a special blunt periosteal elevator so as to mobilise the sesamoids, returning them to their normal position, i.e. shifted medially. The sesamoids are then anchored beneath the metatarsal head with a single stitch of silk, fixing them directly to the metatarsal periosteum following the Viladot method [10].

The capsule is sutured whilst the first toe and metatarsal bone are maintained in a position of slight hyper-correction. A simple bandage protects this new position during the first few days after the operation. Placing weight on the heels may be allowed straight away, with flat-heeled open footwear. On the fifth day, it is advisable to begin cautious active mobilisation exercises without any weight on the first ray. In order to reduce strain on the transverse arch, a plantar support is prescribed.

Fig. 1 Regnaud technique. Basal portion osteotomy of the first toe proximal phalanx

Results

Assessment card scores were higher than 70 (excellent) for 12 feet, between 60 and 70 (good) for 14, and between 50 and 60 (fair) for two. There was no score lower than 50 (poor) (Table 1). In 12 cases, non-symp-

tomatic plantar hyperkeratosis was found, ten patients reported they wore footwear with broad, soft uppers only, and six used plantar supports. All feet examined showed Greek-type or equal morphology. All subjects were satisfied with the aesthetic and functional results; four subjects reported having taken up non-competitive sport activities (skiing, marching) less than 40 days after

Table 1 Results of Viladot-Regnaud operation for hallux valgus

Foot	Gender	Age at operation	Age at follow-up	Follow-up	Valgus angle correction	Intermetatarsal angle correction	Stiffness	Cavus	Footwear restriction	Score
1	F	44	70	26	29°	7°	Yes	No	No	68
2	M	45	65	20	18°	9°	No	No	No	72
3	M	34	59	25	19°	8°	No	No	Yes	68
4	F	43	62	19	16°	5°	No	Yes	Yes	70
5	F	65	80	15	15°	7°	No	No	No	70
6	F	50	63	13	28°	8°	No	No	No	75
7	F	51	70	19	15°	12°	No	Yes	Yes	72
8	F	61	79	18	25°	11°	No	No	No	75
9	F	61	80	19	17°	9°	Yes	Yes	No	66
10	F	42	56	14	13°	7°	No	No	No	75
11	M	44	56	12	8°	4°	No	Yes	No	60
12	M	51	74	23	12°	9°	No	No	Yes	62
13	F	50	69	19	13°	7°	Yes	No	No	60
14	F	57	75	18	14°	9°	No	No	Yes	70
15	M	44	65	21	19°	7°	Yes	No	No	65
16	F	46	65	19	12°	6°	No	No	No	68
17	F	33	59	26	20°	9°	No	Yes	Yes	72
18	M	40	57	17	8°	5°	No	Yes	Yes	65
19	M	64	79	15	18°	8°	Yes	No	Yes	68
20	F	45	64	19	23°	9°	No	No	No	67
21	F	58	77	19	15°	8°	No	No	No	72
22	F	61	79	18	13°	4°	Yes	Yes	Yes	65
23	F	57	77	20	10°	4°	No	No	Yes	75
24	F	40	57	17	8°	6°	Yes	Yes	Yes	52
25	F	39	61	22	12°	7°	Yes	No	Yes	55
26	M	50	67	17	11°	8°	No	Yes	Yes	60
27	F	64	76	12	8°	6°	Yes	No	Yes	62
28	M	38	61	23	14°	7°	No	Yes	Yes	70

Fig. 2 A 41-year-old woman with 15 years follow-up: **a** pre-operative radiograph; **b** radiograph at follow-up; and **c** clinical, and **d** podoscopic, appearance at follow-up

the operation. Healing occurred with no complications; no patient reported limitations on duration and distance of walking.

Radiographic measurements showed an average pre-operative hallux valgus angle of 30° (20° – 43°) and an average pre-operative intermetatarsal angle of 15° (8° – 20°). The long-term follow-up showed an average valgus angle correction of 15° (8° – 29°) and an average intermetatarsal angle correction of 7° (4° – 12°); the sesamoids were medialised on average by at least 25% compared to the pre-operative situation. Subjective radiographic valuation of arthritic degeneration at the level of the metatarsal-phalangeal joint showed an increment proportionate to the number of years since the operation, in the absence of appreciable pain or rigidity syndromes. Podoscopic examination revealed the presence of cavus in ten cases.

Discussion

Sesamoid anchorage by the Viladot technique combined with Regnaud arthroplasty has enjoyed great popularity both in Italy and Europe. Association of these methods is based on the following premises: (1) Proximal phalanx shortening to re-establish the Greek forefoot type best suited to modern footwear and to reduce traction exercised by the long extensor tendon of the hallux; (2) Repositioning sesamoids to their natural seat to re-establish their static and dynamic function and restore physiological forefoot short muscle condition; (3) Reducing metatarsal bone varus, de-rotating the hallux if pronated, and capsular tensioning; and (4) Joint mobility conservation.

Although the number of cases is relatively small, the study reports some interesting observations, taking into account uniformity of technique and the long follow-up. The partial loss of hallux valgus correction, even in the cases dating furthest back (26 years), appears to be well compensated by the preventive hyper-correction applied, and has given no rise to recurrences. Radiographic follow-up showed appreciable correction of metatarsal bone varus and sesamoid repositioning. Clinical examination showed a morphologic foot of the Greek or equal type in virtually all cases (Fig. 2a, b, c, d).

Cases showing the most aggravation of initial arthritic deteriorations (apparent in the metatarsal-phalangeal joint, even in pre-operative radiograms) involved older patients and those whose time since operation was the longest. Arthritic degeneration was causing neither pain nor rigidity in any cases at follow-up. Despite the continuing presence of an acceptable alignment, the problem that caused most inconvenience was overlapping of the second toe, which occurred in four cases.

Cavus deformity appeared to have slight coincidence with correction maintenance (Fig. 3a, b, c, d) in the absence of painful syndromes or objectively ascertainable deterioration. In no case was inadequacy of the first ray found with subsequent shifting of weight-load onto the second and third metatarsal bones leading to metatarsalgia.

Similarly positive results but with shorter follow-up and variations in surgical technique have been reported in more recent case studies [5, 8] in which the Regnaud technique was used. De Palma et al. [3] reported good results, even when the insertion technique was reversed (second Regnaud technique); i.e. by inserting the distal phalangeal part into the medullary canal of the proximal part. Jarde et al. [5], in a study with an average follow-up of 5 years, reported positive results in more than 72% of patients who underwent surgery using the Regnaud technique. Technical variants on the soft tissues, often

Fig. 3 A 40-year-old man with 18 years follow-up: **a** pre-operative radiograph; **b** radiograph at follow-up; and **c** clinical, and **d** podoscopic, appearance at follow-up

not entirely comprehensible in the description of surgical work contained in published review studies, make comparison of the various operations impossible.

For the last 30 years, many more techniques have been added to the already abundant range present in the literature, with the appearance of new complications and contrasting results. This fact, and the observations set forth in this study, makes the validity and modernity of the described procedure even more convincing.

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