

BRITISH ORTHOPAEDIC FOOT SURGERY SOCIETY

A meeting of the British Orthopaedic Foot Surgery Society was held at Sheffield on November 27, 1987, with Professor T. Duckworth in the chair.

SCIENTIFIC PAPERS

Investigation of the planovalgus foot in later life – *S. Parsons, I. G. Winson, R. H. Nakielny, R. Betts, N. R. M. Kay and T. Duckworth* (Sheffield) had noted that a planovalgus foot was common in middle-aged and elderly patients. It was frequently (80%) associated with hindfoot pain, which was difficult to localise.

Commonly the deformity followed trauma, arthritis, neuromuscular imbalance and sensory deprivation. Their study of 46 valgus feet in 27 patients assessed the value of modern techniques in defining the aetiology of the flatfoot and the cause of the pain.

Clinical examination showed universal heel valgus of 5 to 30°, all correcting when relieved of weight, and forefoot supination and abduction in some. Standard radiographs showed degenerative changes in the tarsometatarsal joints (eight cases), the mid-tarsal joint (six cases) or the sub-talar joint (one case).

Pedobarography revealed the commonest pattern of loading to be an increase of medial heel, sole and forefoot contact and load, increased weight-bearing at the mid-foot, defunctioning of the hallux and a shift of weight-bearing laterally at toe-off. CAT scanning showed inter alia a variety of arthritic foot joints (20 cases), impingement syndromes (three cases), coalitions (four cases) or tendon ruptures (four cases). A definitive diagnosis could be made in 60% of cases.

Moulded heel cups for the correction of hindfoot deformity – *I. Stockley, D. J. B. Herd and D. I. Rowley* (Salford) claimed that hindfoot deformities were treated with neglect by many and standard orthoses were often unsuitable, cumbersome and unsightly. Their pilot study of moulded polypropylene heel cups reported experience of 11 cups in nine patients. Five patients had rheumatoid arthritis, three a neurological cause and one a post-traumatic valgus deformity.

Cups were made from casts of the patient's corrected foot and were worn in standard shoes. The square section of the orthosis was necessary to turn vertical force (body weight) through a right angle to produce a horizontally directed corrective force, further increased by adding a medially based wedge to the undersurface of the cup.

Hindfoot correction was assessed radiographically using Samuelson's double exposure, standing, postero-anterior heel view, with the tube inclined up 20° from the horizontal. From this the heel valgus index could be measured and a mean correction of 8° (range 5 to 15°) was obtained in eight feet with a mobile valgus deformity. No correction was achieved in three feet with fixed deformities.

They felt that clinical assessment of the cup was necessary and were continuing to assess the cup dynamically using force plate analysis.

Civilian talo-calcaneal blast injuries caused by landmine explosions – *L. G. H. Jacobs* (Kirkcaldy) and *J. C. S. Steytler* (Tygerberg, South Africa) described the orthopaedic injuries of

57 patients treated in Namibia. There were 63 compound and 45 closed fractures; 83% of the compound fractures included injury to the talo-calcaneo-navicular unit, malleoli and distal tibia and fibula. Amputation was performed in only 19 cases.

Initial surgery conformed to usual wartime practice, with care to remove cordite impregnation and debris along tissue planes of blast dissection and with external fixation for severe fractures. Later surgery was limited to trimming bony irregularities on the sole. Formal arthrodeses were not needed. Physiotherapy was important to mobilise the toe joints and to prevent equinus. The typical clinical picture of "landmine foot" included pigmentation and non-tender scars on the sole, distortion of the plantar fat pads, fibrosis of muscles and tendons, stiffness of toes and tarsus, bony distortion, but adequate circulation and sensation. Optimum management was found to be the fitting of a leather "landmine boot", made to a cast of the foot and fitted with a plastizote insole. The boot was stiffened from metatarsus to ankle, fully opened to the toe and fitted with a rocker sole. A splay or wedge was added to the heel for varus or valgus deformity.

The anatomy, pathology and management of degenerative changes of the tibialis posterior tendon – *M. H. Jahss, Z. Rosenberg and Y. Cheung* (New York) discussed this topic in relation to 58 feet of 55 patients of whom 67% were women and 18% had signs of rheumatoid arthritis.

The disease progressed through stages. Stage 1 of tendon fissuring (initially, 1A, on the deep surface), tearing, elongation and scarring (Stage 1B) and associated tenosynovitis. Stage 2, while still reparable, exhibited elongation, adherence to bone and loss of tendon sheath. Stage 3A, while similar to Stage 2, showed a tendon gap too wide to close and Stage 3B showed peritalar subluxation of the tarsus. Stage 1B was the commonest (23 cases). Patients were investigated with plain radiographs, CT scans and MRI in which normal tissue showed an even black colour. Stage 1 disease was treated by direct repair of fissures and cross-suture to flexor digitorum longus on either side of the degenerate area. Stage 3 disease necessitated tendon grafts or triple arthrodesis.

Results depended upon the stage of the disease, the length of history (under or over 2.5 years), the efficacy of surgery and related disease (e.g. rheumatoid arthritis), but not on age.

Metatarsal head excision for rheumatoid arthritis, with and without fusion of the hallux – *D. L. Grace, J. R. Hughes and L. Klenerman* (London) compared 34 painful, deformed rheumatoid feet treated by excision of the metatarsal heads with 34 similar feet which had the lesser metatarsal heads excised and the first metatarsophalangeal joint arthrodesed. The results were worst in those feet with failure of fusion of the hallux (35%). In those feet with successful fusion, the results were comparable to those following excision of all five metatarsal heads. Metatarsalgia and plantar callosities were more common after excision arthroplasty, but shoe-fitting, correction of deformity and the pedobarographic contact times of the lesser toes were better. Patient satisfaction, overall gradings and great toe pedobarographic readings were similar in both groups. Results were more variable after the fusion operation and the complication and re-operation rates (11 feet) were

higher. For this reason, excision arthroplasty rather than fusion of the hallux is recommended when the lesser metatarsal heads are removed.

Forefoot arthroplasty: a clinical and pedobarographic appraisal – *I. Stockley, P. R. Betts, C. J. M. Getty, D. I. Rowley and T. Duckworth* (Sheffield) noted that the common and severe involvement of the forefoot in rheumatoid arthritis had been treated by several methods of forefoot arthroplasty. Clinical assessment alone made difficult any comparison between different series. The study assessed clinical results and compared them with an objective measure of foot pressures, the pedobarograph.

Thirty-five adult rheumatoid patients with an average age of 58 years, were studied prospectively with a mean follow-up of 37 months. The indication for surgery was severe pain in the forefoot. The operation performed on all patients was a modified Kates-Kessel-Kay arthroplasty, excising the lesser heads through the sole, the first through the dorsum and preserving the sesamoids.

Results showed that 91% of all patients were satisfied with the outcome; 73% of feet were painfree, in 23% pain was eased, but in 4% it was worse following surgery.

The pedobarographic studies showed that pre-operatively 70% of the feet recorded abnormal pressures, but at review 52% were normal. At review, 69% of the feet recording abnormal pressures had high loads under the first metatarsal, especially if the hindfoot were in valgus. Their clinical and pedobarographic results showed that in the majority of patients, forefoot arthroplasty relieved pain, improved general mobility and effectively decreased high, abnormal pre-operative pressures, with a shift in forefoot load towards the first metatarsal.

V-Y Plasty for the correction of overlapping fifth toe in children – *R. W. Paton* (Manchester) said that the operation of V-Y plasty has been employed for over 35 years for the treatment of overlapping fifth toe. No paper has been published of the results of this procedure in children, with reasonable case numbers and long-term follow-up. He reported results of 20 operations in 16 children, of average age nine years, with equal numbers of each sex. Operations were undertaken for cosmetic reasons or for shoe pressure problems.

The operation consisted of a V-incision in the fold of skin formed when the toe was pulled into the corrected posture, tenotomy of the extensor and capsulotomy of the metatarsophalangeal joint, followed by closure as a Y. The short term results were good in 70% of cases. However, results deteriorated markedly with time, with only 30% good at a second review (at an average of two years later).

This procedure cannot be advocated for use in this condition. Alternative operations were reviewed.

The results of Kirschner wire arthrodesis for deformed lesser toes – *S. P. Hodgson* (Blackburn) commented on the dearth of literature about this commonly performed procedure.

He presented the results of 84 arthrodeses, in 42 patients, of second, third and fourth toes. Follow-up was at six to 18 months after surgery. Thirty-four complications (four infection; 16 malunion; three non-union; four metatarsalgia and seven problems with the wires) occurred in 25 toes (30%). Despite this high incidence of complications, subjective results were good, with 93% of patients satisfied with the outcome of surgery. The duration of retention of the Kirschner wires had no influence on the rate of non-union. The incidence of complications was unrelated to the experience of the operator, but the importance of attention to technical detail was stressed.

It was concluded that Kirschner wire arthrodesis can be

recommended for fixed deformity of the lesser toes with the expectation of a good cosmetic and symptomatic result.

A randomised controlled trial of surgical or phenol ablation of the nailbed in the treatment of ingrowing toenails – *G. R. Tait and J. S. Tuck* (Glasgow) noted that phenol ablation of the nailbed had gained popularity and that results were said to be equal to those of surgery. They had carried out a prospective trial of the two methods in the treatment of all 104 ingrowing and onychogryphotic toenails presenting over a nine-month period. The procedures were carried out under local anaesthetic on an out-patient basis.

The results demonstrated that there was no difference in postoperative pain, infection, time to healing or symptomatic recurrence rate between the two techniques. However, phenol ablation was superior in several respects. Phenol, a potent antiseptic, allowed treatment to be carried out in the presence of infection or in less than ideal operative conditions with no increased risk. The delay until definitive treatment from the time of presentation was reduced from 81 to 17 days on average in favour of the phenol group.

Ease of operation, cosmetic results and the results in onychogryphosis were also better with phenolisation.

Twenty years after: a follow-up study – *J. M. Fitton* (Leeds) reported upon four cases of transfer of the long toe flexors to act as dorsiflexors of the foot, performed 20 years previously in patients in whom other methods (e.g. tibialis posterior transfer) were not available after degloving injuries. The toe flexors had little function when the extensors were lost, they were long and easy to fix to bone and they were not phase-restricted in action.

It was necessary to resect the middle third of the fibula to accommodate the bulk of the muscle and to achieve a direct line of pull. This led to ankle instability in one case and therefore the lower fibula should be fixed to the tibia. Two other patients developed hallux valgus.

Congenital and acquired hallux varus – *B. Joseph* (Manipal, India) stated that hallux varus was uncommon in the west, but was encountered frequently in rural India, where 69 feet with the deformity were studied.

There were three types of congenital hallux varus. The "primary" type was the commonest and not associated with any other foot deformity. The intermetatarsal angle was 5 to 7° and the metatarsal head was flattened. "Secondary" hallux varus occurred in association with congenital talipes equinovarus. These two varieties were easier treated in infancy, but progressed with age in unshod persons if left untreated. "Teratogenic" hallux varus showed the features of short first metatarsal, extra ossicles and a tight medial fibrous band at the metatarsophalangeal joint, with gross varus (e.g. 90°).

Among the acquired forms was idiopathic hallux varus of middle age, which developed spontaneously in the unshod and probably had an occupational basis. Hallux varus in rheumatoid arthritis was part of a pattern of deformities in which the first ray collapsed in a zig-zag manner in two planes, with forefoot abduction at the mid-tarsal joint and medial and plantar toe deviation.

After cadaveric dissections of 25 feet, it was concluded that there was no anatomical basis in the insertion of abductor hallucis for the predilection for the deformity among Indians. Failure to use footwear could account for the incidence of the deformity in India.

Normal forefoot pressures – *E. G. Anderson* (Glasgow) reported on pressure distribution patterns under 150 normal feet. The commonly accepted description of the progression of weight-bearing was not always found. In fact four normal patterns

emerged: (Pattern A) from heel to metatarsal heads two and three to hallux - 48%; (B) from heel to heads two to five - 24%; (C) from heel to first metatarsal head - 17%; (D) from heel to heads one and two to hallux - 11%.

The group into which any foot fell was not related to body weight, shoe size, foot shape, to the relation of the patellar line to the foot or even to right or left side.

Some biomechanical aspects of high and low arched feet - A. Huson (Leiden, Netherlands) described the transmission of tibial external rotation into inversion of the tarsus. There was a delay at ankle level in the transmission of rotation as the ankle ligaments were tensioned, but no delay in the progression of motion within the tarsals, which acted as a slip-free linkage. Rupture of the anterior talofibular ligament increased the delay, but was followed by abrupt, uncontrolled tarsal rotation. The angular velocity curve of tarsal rotation was influenced by the height of the arch, a low arched foot requiring a greater turning moment on the tibia to effect foot inversion and vice versa. Tension in the extrinsic tendons (especially the peronei) inhibited the ease of transmission of rotation.

The significance in relation to ankle injury was discussed.

Modified Mitchell's osteotomy for hallux valgus - C. J. Hindley and D. G. Carden (Southport) described the technique and results of a modified Mitchell's operation, which combined step osteotomy of the metatarsal and a Silver's procedure to achieve fixation. A short medial plaster slab was worn for about seven weeks postoperatively. This technique had been used for every case of hallux valgus requiring surgical correction in an initial series of 17 women (25 operations), with a mean age of 55 years (range 30-78 years) and a minimum follow-up of six months.

Results were excellent in 12 (48%) and good in 11 (44%), being downgraded for stiffness in six, residual hallux valgus in four and aching in one. Mean hallux valgus angles were reduced to half and increased intermetatarsal angles by a quarter by the operation, but in addition a Metatarsal Ratio (that of the distance on a radiograph between the heads of the first and fifth metatarsals to the length of the second metatarsal) was used to determine the reduction in forefoot width on weight-bearing radiographs. The use of this ratio avoided errors due to varying magnification in radiographic assessment.

The ratio was reduced by only 3% and this suggested that only a small reduction in forefoot width was needed for a satisfactory result.

A modification of Mitchell's osteotomy of the first metatarsal - S. L. Chitnis and S. C. Chen (Enfield) reported a modification of Mitchell's osteotomy in which the joint was not opened and no exostectomy carried out. Drill holes were made in the dorsal cortices only of the proximal and distal fragments after the step-cut osteotomy and lateral displacement of the metatarsal head. This ensured accurate placement of the suture and eliminated excessive, unnecessary dissection. Bone union was encouraged by bone grafts obtained locally. Weight-bearing casts were applied for eight weeks.

Of 33 feet (23 patients) reviewed, 45% were graded excellent, 39% good and the remainder fair, by the criteria of Bonney and MacNab. There were no poor results. Objective clinical results and patients' subjective opinions tallied closely. Pedobarographic studies were also carried out, showing pressure area distribution following surgery, especially in relation to metatarsalgia.

The behaviour of the collateral structures of the hallux - N. P. Trimmings and D. W. Wilson (London) had measured the angular deviations produced at the first metatarsophalangeal joint by valgus and varus strains applied to the great toe, using a simple apparatus, in 246 feet of 124 individuals.

Subjects were grouped by sex and then classified as bilaterally normal, bilaterally abnormal (that is, with hallux valgus) or unilaterally abnormal. Ninety-one male feet were included in the three groups as 75 bilaterally normal, 10 bilaterally abnormal and six unilaterally abnormal. One foot was unsuitable for study. Similarly, 155 female feet were classed as 54 bilaterally normal, 79 bilaterally abnormal and 22 unilaterally abnormal. One was unsuitable.

The average ages were 48 years in both male and female groups and these groups were suitable for statistical comparison. In all groups both the medial and the lateral collateral structures reacted to incremental strains in a linear fashion. However, these structures were significantly more easily stretched (both medially and laterally) in females with bilateral hallux valgus (abnormal group) than in any other group.

The findings suggested an inherent weakness of the composite capsular structures which predisposed to hallux valgus in certain females.

Preliminary results of percutaneous exostectomy in hallux valgus - H. P. Markowski, P. Bösch and V. Rannicher (Wiener Neustadt, Austria) aimed to minimise surgery and postoperative convalescence in suitable cases with a painful bunion, slight hallux valgus (under 30°) and a normal joint. The New-Steinböck operation consisted of a 3 to 5 mm incision and bunionectomy by milling off the exostosis with a burr drill. Local anaesthesia was possible.

Ninety-nine feet of the first 103 operations were followed up. In 28 cases, an Akin varus osteotomy of the proximal phalanx was added, also performed percutaneously by the burr drill and fixed with compression bandages only. Immediate weight-bearing was allowed. The mean follow-up time was 22 months. Most patients were female, of average age 48 years. Sixty-six feet were regarded as excellent by the patients, 24 as good, three as fair and four as poor. Two feet were not assessed.

Shoe tolerance was much improved, with no discomfort at all in plain shoes in 70 feet. The average range of motion at the metatarsophalangeal joint was diminished from 68 to 55° and the average hallux valgus slightly increased from 23 to 25° in those cases without Akin osteotomy. In 22 feet a bone spike was seen on radiographs, just proximal to the original exostosis, but it caused symptoms only in two cases. Few complications were observed and only six feet needed re-operation.

Computed tomography in the early assessment of fractures of the hindfoot - K. S. Baird, R. Briggs and P. H. Gibson (Aberdeen) concluded that coronal plane computed tomography was a useful adjunct to the investigation and treatment of fractures of the hindfoot. They reported on scans performed within five days of injury in 10 patients with 14 fractures.

In seven patients, computed tomography provided graphic information which was not readily discerned from conventional radiography and in two patients, tarsal bony injuries not seen on radiographs were clearly demonstrated.

The degree of comminution, position of fragments, subtalar joint involvement and disruption of the articular surfaces could be more accurately assessed by computed tomography.

Two patients proceeded to open reduction and internal fixation and additional information from the scans was used to plan both the operative approach and the operative procedure. Postoperative scanning proved superior to conventional radiography in confirming the adequacy of the reduction.