METATARSOCUNEIFORM EXOSTOSIS—EVALUATION AND PRINCIPLES OF MANAGEMENT

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INTRODUCTION

The first metatarsocuneiform joint (MCJ) exostosis is a common presenting complaint in the forefoot. It may present as an isolated deformity causing shoe irritation. It may likewise appear in combination with a variety of local first ray conditions such as hallux valgus, or systemically related conditions such as Charcot joint disease. Careful clinical assessment, accurate diagnosis, and a logical approach to treatment is in order. The variety of tissues in this anatomic area, coupled with the complexity of first ray function, demands special attention to this relatively common forefoot problem (Fig. 1).

To understand the complexity or simplicity of the condition, treatment will be related to the physical findings and chief complaints of the patient. This practical approach may help to keep the discussion more clinically oriented. A thorough review of the possible clinical syndromes is provided, and patient complaints are correlated to clinical findings. Management is based on clinical findings and a review of surgical techniques follows. We will emphasize the surgical approaches and techniques.

CLINICAL HISTORY

First metatarsocuneiform joint problems may be a primary concern or only a secondary complaint of the patient. Often the patient is distracted by a painful hallux valgus or hallux limitus so as to be unaware of significant discomfort proximally at the first metatarsocuneiform joint. The old saying "sitting on a tack, while being hit with a stick" can only too often be realized postoperatively. With successful correction of primary complaints, secondary concerns may move to assume their place. The first metatarsocuneiform joint should be thoroughly evaluated in any condition affecting the hallux or first metatarsophalangeal joint.

Pain or complaints about the first metatarsocuneiform joint vary according to the tissue involved. Symptoms help assess the soft tissues and osseous structures involved. The complaint may be as simple as skin irritation over the *bump* on the dorsum of the foot. Rarely is the situation this simple on close examination (Fig. 2).

Deep aching pain, especially coupled with post-static dyskinesia may signal significant arthrosis or joint involvement. The level of pain, either superficial or deep can be a helpful clue. A history of trauma, recent or past, and its management at the time of injury is very important in arthrosis assessment.

If trauma is reported, a thorough record of the past diagnosis and treatment should become part of the office record. Whether dislocation, fracture, or tendon injury was present or suspected should be determined. Years may pass before the complications of an overlooked or subtle injury present.

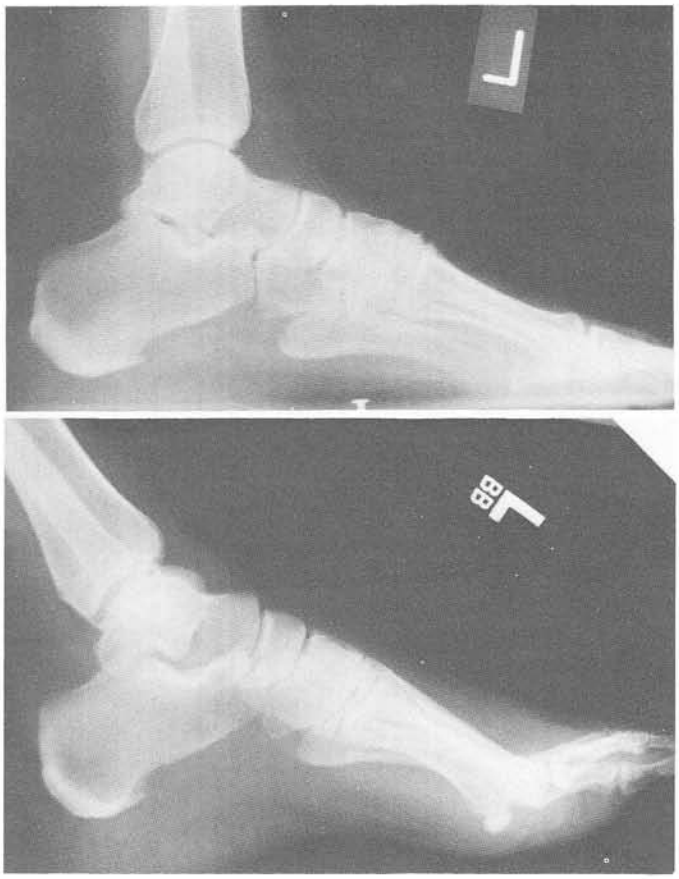

Fig. 1. A. Preoperative lateral radiograph and, B. Postoperative lateral radiograph of first metatarsocuneiform joint (MCJ).

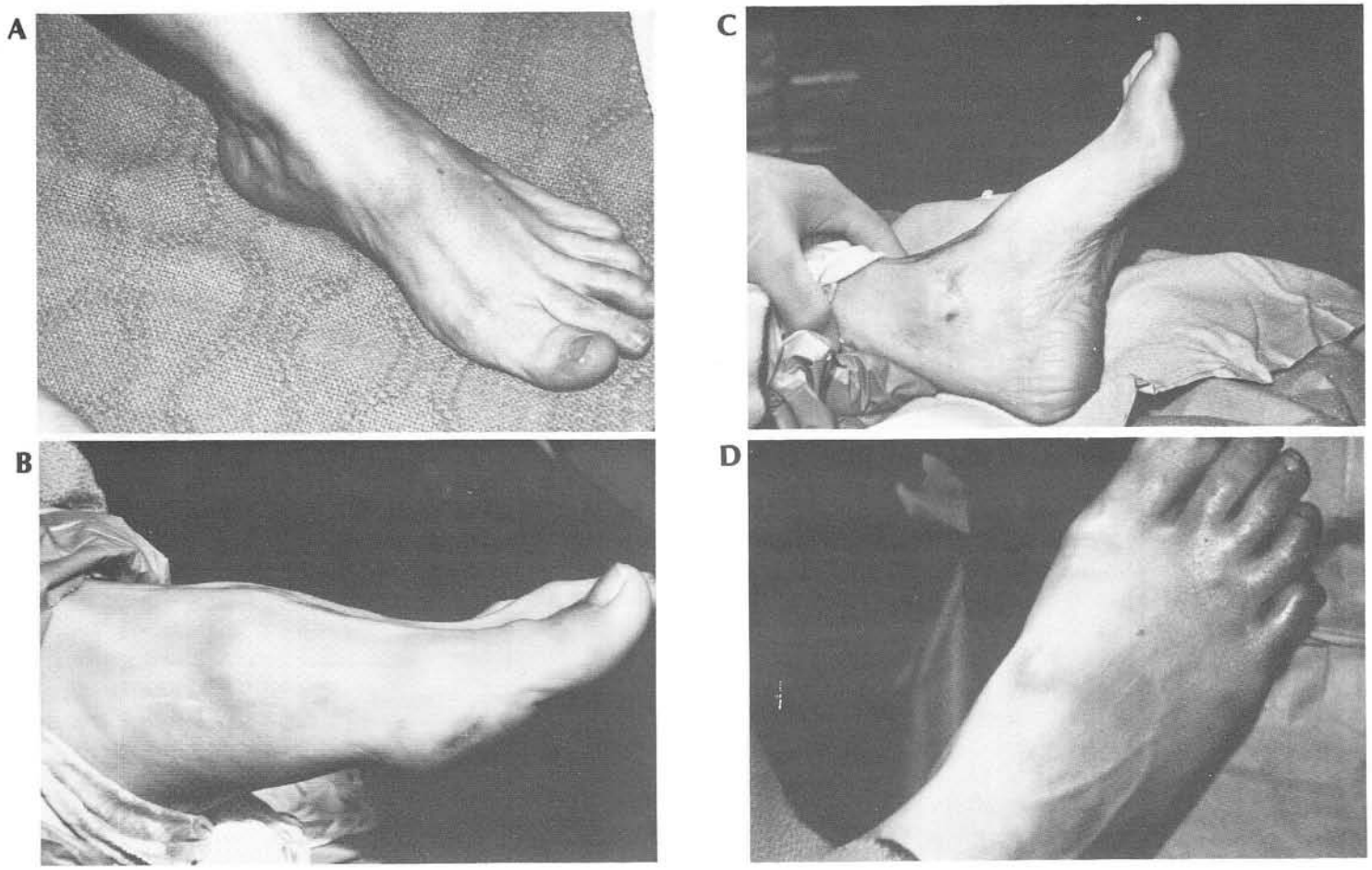

Fig. 2. Differential diagnosis of first metatarsocuneiform joint prominences. A. First MCJ exostosis. B. LisFranc's joint hypertrophy as seen here post-traumatic. C. Pseudo-exostosis of pes cavus. D. Soft tissue mass represented by ganglion here.

A treatment summary or copy of office or emergency room records may be helpful. Only then can the appropriateness of treatment provided at the time of injury be assessed. It should be kept in mind that standards of care may vary regionally and may have been changed or adapted over time. An injury twenty years ago may have been treated far differently than it would be today.

Burning or other paresthetic complaints need to be carefully assessed, especially if operative options are being considered. The presence of these findings preoperatively is critical. Postoperative neurologic symptoms may only be a continuation or exacerbation of a preoperative neuropraxia. They need not necessarily be a postoperative complication. Such symptoms may signal beginning healing of nerve tissue long damaged by chronic shoe pressure and irritation preoperatively.

The patient must be asked specifically about neurologic type symptoms. These should be accurately recorded in the patient chart. A mapping by the patient of any areas of paresthesia or numbness with photographic or artistic record in the patient chart is very helpful. Rarely is a diagnosis of simple metatarsocuneiform joint exostosis made without a concomitant diagnosis of neuritis. The neuritis may involve either the medial dorsal cutaneous nerve or saphenous nerve. The dermatome distribution of discomfort will help make the distinction (Fig. 3).

Extreme soft tissue pain of an acute nature may mark the presence of tendinitis. Pain on activity, especially against resistance, generally points to tendon involvement. Tendinitis usually produces severe pain, at times incapacitating in its severity. Surgical consideration for a first metatarsocuneiform joint exostosis complicated by tendinitis may need to be delayed until the tendinitis can be controlled. Careful note should be made of any history of tendon injury or lacerations about the area of the first metatarsocuneiform joint. Subtle tendon lacerations misdiagnosed in prior years may present with first ray deformity as a complication. The force of tendon imbalance about the first ray should not be underestimated.

The complaint may be only of a mass, swelling, or a growth on the dorsum of the foot. Careful history as to the onset, duration, and changes in size should be noted. One should avoid snap diagnosis but keep an open mind

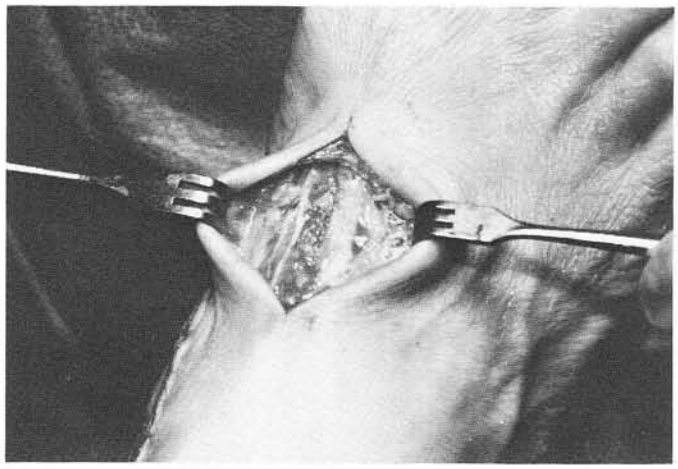

Fig. 3. Extensor hallucis longus tendon and medial dorsal cutaneous nerve as visualized in dissection of first MCJ.

to the diagnostic possibilities. Neurologic symptoms may characterize patient concern, yet an unknown soft tissue mass or carcinoma may become your concern. Pressure from a tumor can result in misdiagnosis.

Commonly ganglions may be found on the dorsum of the foot. Adventitious bursae that become acutely inflamed are occasionally encountered at this level of the forefoot. A bony prominence may be present in conjunction with one or all of these soft tissue conditions. The possibility of multiple diagnosis should always be considered. No one diagnosis is mutually exclusive.

Past medical history is always an important part of the initial or follow-up discussions with any patient. Bony prominence complaints or concerns can be associated with Charcot joint disease. The first metatarsocuneiform joint or LisFranc's joint complex is a common site of Charcot degeneration. Generally, the hypertrophy of bone associated with Charcot disease is tremendously exaggerated compared to degenerative joint disease. In addition there is normally a significant associated hypermobility. The exostosis of Charcot joints can be variable along the metatarsocuneiform joints or involve any or all of the lesser and greater tarsal joints. The etiology of the Charcot joint can be variable as well. The diagnosis may include diabetes mellitus, as well as alcoholism, tabes dorsalis, or spinal cord tumors and trauma. A careful history can be very helpful in attempting to establish the diagnosis of Charcot disease prior to any radiographic or laboratory confirmation.

Charcot joint changes may appear at any stage in the disease. Early presentations as well as sequellae from longstanding joint disease are all possible. The early Charcot changes may be the first clinical sign of a systemic disease process.

As the history of the chief complaint is being taken one should think of all tissues present in this area of the foot from skin to bone. Questions should be asked specifically beginning at the skin level and working from superficial to the deeper joint levels. A quick screening question at each tissue level helps guide more in-depth assessment. All tissues are thus screened prior to the physical examination. The physical examination can then be more logically performed.

A cross-section of the first metatarsocuneiform joint includes all tissues, osseous and soft, as found in any extremity. Each may be of primary concern or secondarily affected. Careful clinical questioning begins the thorough evaluation process.

PHYSICAL EXAMINATION

Physical assessment logically follows the careful history. A logical sequence of evaluation maneuvers superficial to deeper tissues is also helpful in this portion of the history and physical. The examination will emphasize those areas of concern noted in the history, yet at least screen all tissues and layers present. The absence of neurologic complaints, for example, in a chief complaint does not mean that the nerve function is not at least screened. Sensory neuropathy of diabetes mellitus can be overlooked where its presence would be helpful in the diagnosis of Charcot disease hypertrophy of the first metatarsocuneiform joint.

The skin is evaluated first to describe any visual findings of edema, erythema, or changes in texture. These changes in texture may take the form of hypertrophy, lichenification, or callosity. Ulcerative breakdown in the face of poor vascular status and pressure may be noted. The exact location of irritation from the shoe on the dorsum of the foot should be noted. This irritation may be localized to the first metatarsocuneiform joint or extend more laterally across Lisfranc's joint.

The subcutaneous layer is considered next. The nerves are first screened by several physical assessment techniques. Sensation is established for light touch and pressure for the distribution of the saphenous nerve, medial dorsal cutaneous nerve, and deep peroneal nerves. Varying nerve dermatome distributions are possible for this area of the forefoot. For clinical evaluation purposes, only the sensation that is present and of normal quality is of importance. Any change or alteration should be carefully noted as compared with the contralateral extremity.

The nerves are then palpated to recreate any pain or paresthesia distally as may be noted during ambulation in shoe gear. Any nerve, if palpated firmly enough, will create paresthesias distally. If, however, light digital palpation or percussion produces significant discomfort, neuropraxia or neuritis should be considered as a

diagnosis. General hypertrophy of the nerve itself may be noted as compared to the unaffected extremity. The medial dorsal cutaneous nerve and its terminal branches are the most commonly affected in this area of the forefoot.

The subcutaneous layer may contain masses such as bursae or tumorous swellings. Masses at this level may be fixed to the skin and immobile with respect to it. The level of the mass with respect to the extensor tendons should be carefully noted. The extensor tendons lie immediately deep to the deep fascia. If the mass is noted superficial to the extensor tendons the mass, at least in part, lies superficial to the deep fascia. The relationship of the mass to the extensor tendons is very helpful in determining depth of the mass. It must be kept in mind that the deeper masses, especially ganglions, may extend from the deeper layers through the deep fascia to the more superficial layers.

The deep fascia and extensor tendon layer is considered next in the clinical evaluation process. The tendons should be carefully palpated for continuity from origin to insertion. Any areas of hypertrophy or atrophy should be noted. Manual muscle testing of all first ray intrinsic and extrinsic muscles should be carefully assessed and charted. All pedal tendons should be screened at a minimum. A ruptured tibialis posterior tendon can present as a rapidly progressing pes valgus in a geriatric patient with a complaint of first metatarsocuneiform joint pain.

Subtle, slowly changing foot problems and deformities are generally the result of tendon imbalance. The first ray is plantarflexed and this results in apparent first metatarsocuneiform joint prominence, not necessarily exostosis.

Tendinitis appears clinically as an acutely tender area about the dorsum of the foot. Pain may extend along the tendon sheaths into the ankle area. Discomfort may be present with active motion especially against resistance. The clinical signs may appear so severe as to mimic gout. Tendinitis and inflammation of surrounding tissues is a very painful clinical situation.

The bone and joint structures are assessed for possible exostosis formation. Local palpation of the joint about its entire circumference should be carried out. Rarely is hypertrophy strictly a dorsal phenomenon. Patient complaints are strictly dorsal due to the susceptibility of the bony prominence to shoe irritation. The plantar hypertrophy is protected by the padding of the intrinsic muscles within the arch of the foot (Fig. 4).

The lateral extent of the osseous hypertrophy should be carefully palpated. Unrecognized lateral extension of hypertrophy along LisFranc's joint may become exaggerated after resection of first ray hypertrophy.

The stability and range of motion of the first metatarsocuneiform joint is then palpated. An unaffected extremity is a helpful standard to assess the range of motion. An increased range of motion may indicate compromise of the periarticular tissues as noted in Charcot joint disease. Pain on stress and range of motion help identify the presence of arthrosis and arthritic degeneration. Many times it is difficult for the patient clinically to distinguish local irritation from deeper arthrosis related discomfort.

An important differential diagnosis is pseudo exostosis of the pes cavus foot type. In rigid plantarflexed first ray and rigid cavus foot types with the apex of deformity near LisFranc's joint, shoe pressure may be a complaint over the dorsum of the midtarsus. The first metatarsocuneiform joint contours may appear clinically prominent. The first metatarsocuneiform joint exostosis is not

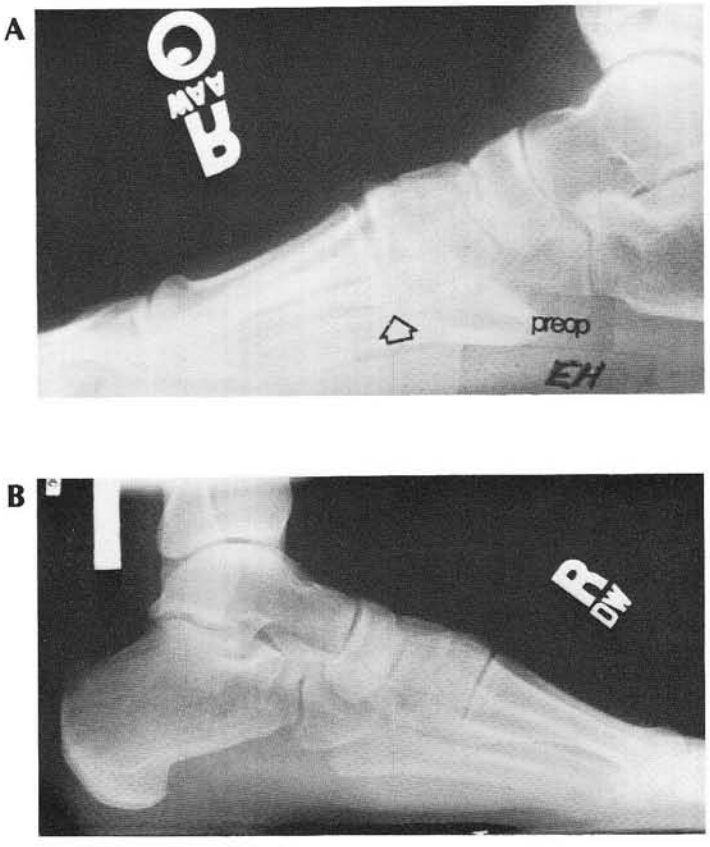

Fig. 4. Radiographic demonstration of first MCJ exostosis. A. Preoperative and, B. Postoperative radiographs.

necessarily the diagnosis. The joint contours may be without exostosis. An apparent prominence is due to the foot type and position. Resection in such cases is of little clinical help in relieving shoe pressure. Pes cavus correction may be needed to help with shoe irritation for such patients. The first metatarsocuneiform joint exostosis is more commonly associated with flexible pes cavus or hypermobile plantar flexed first ray, not rigid ones.

MANAGEMENT PRINCIPLES

The surgical management of first metatarsocuneiform joint prominence involves soft tissue and osseous concerns. If soft tissue masses are present, such as bursae or ganglions, they may require excision. Nerve involvement may require excision or transposition. Osseous procedure selection involves a choice between simple exostosis resection and arthrodesis.

Conservative management is generally attempted as a first line of treatment. Padding and shoe modifications can be very helpful. They are not wasted if operative repair is later carried out. They can become useful postoperative aids while scars are still immature and sensitive. The association of first metatarsocuneiform joint exostosis and first ray hypermobility has been discussed. The use of functional orthoses is very helpful for such patients. The intermittent dorsal compressive forces at the first metatarsocuneiform joint can be reduced by orthoses and effective shoe gear. These devices are likewise very useful in the postoperative management. The use of injectable medication such as corticosteroids can be helpful if tendinitis or neuritis are present. If surgery is considered, some delay following a local injection may be prudent. Compromise to healing tissue may result in the presence of recent local corticosteroid injection.

Ganglions are considered for excision if aspiration and injection therapies are unsuccessful. The chance of nerve entrapment on the dorsum of the foot is great in this anatomic area. This complication is viewed by most patients who experience it as far worse than the original ganglion. Excision of all ganglion tissue needs to be as complete as possible to help avoid recurrence. Recurrence following injection as well as excision is always possible.

If neurologic symptoms are present, special attention may be given to them during surgery. The nerves may be prominent over this area and susceptible to irritation postoperatively. Epineural sutures and nerve relocation to a more protected position may be helpful. Subcutaneous fatty tissue may also be lightly enveloped about the nerve to help secure and protect it. Rarely is resection of a nerve indicated as a primary procedure. Generally, neurectomy is preserved for more recalcitrant cases where other techniques have failed. A small amount of short acting corticosteroid may be applied directly to exposed nerve prior to closure during osseous resection techniques.

Good scar management is mandatory postoperatively until healing is complete. This will help reduce the chance of nerve entrapment. Compression dressings maintained to some degree throughout the scar maturation process can be extremely useful in reducing the density of scar tissue throughout the depth of the surgical wound. Compression needs to be maintained 24 hours daily, well through the collagen phase of healing, until wound maturation begins in 4 to 6 months. Chronic induration and scarring of soft tissues is avoided and more supple mobile tissues are promoted.

Thick dense scarring following osseous resection can be as much a problem in this area as the original exostosis. The firm scar can be as irritating to surrounding nerves as the original exostosis. All the above mentioned measures help reduce the incidence of postoperative entrapment and nerve irritation. Certainly atraumatic technique and meticulous hemostasis must be maintained throughout the operative procedure.

Simple first metatarsocuneiform joint exostosis resection is a very rewarding procedure. Foot function management postoperatively helps prevent recurrence. The exostosis should be considered realistically as a symptom not the diagnosis. The diagnosis is generally an abnormality of foot function resulting increased load on a hypermobile first ray. The exostosis must be viewed as an osteoarthritic process promoted by chronic abnormal joint function.

Significant joint arthrosis with exostosis may necessitate arthrodesis. Arthrodesis is likewise advisable when gross first ray malalignments are present. Arthrodesis is useful when significant uncontrollable or unrepairable tendon imbalance is present. First metatarsocuneiform joint arthrodesis should not be viewed as a correction for associated pes valgus. Such use of this procedure generally results in significant tibial sesamoiditis and eventually more proximal joint compromise and breakdown.

Arthrodesis is considered in cases of Charcot degeneration. Any LisFranc's joint hypertrophy involving more than the first ray, may necessitate more involved arthrodesis across LisFranc's joint. If the Charcot joint collapse is present and hypertrophy exists well across LisFranc's joint, arthrodesis of the entire tarsometatarsal joint complex should be considered.

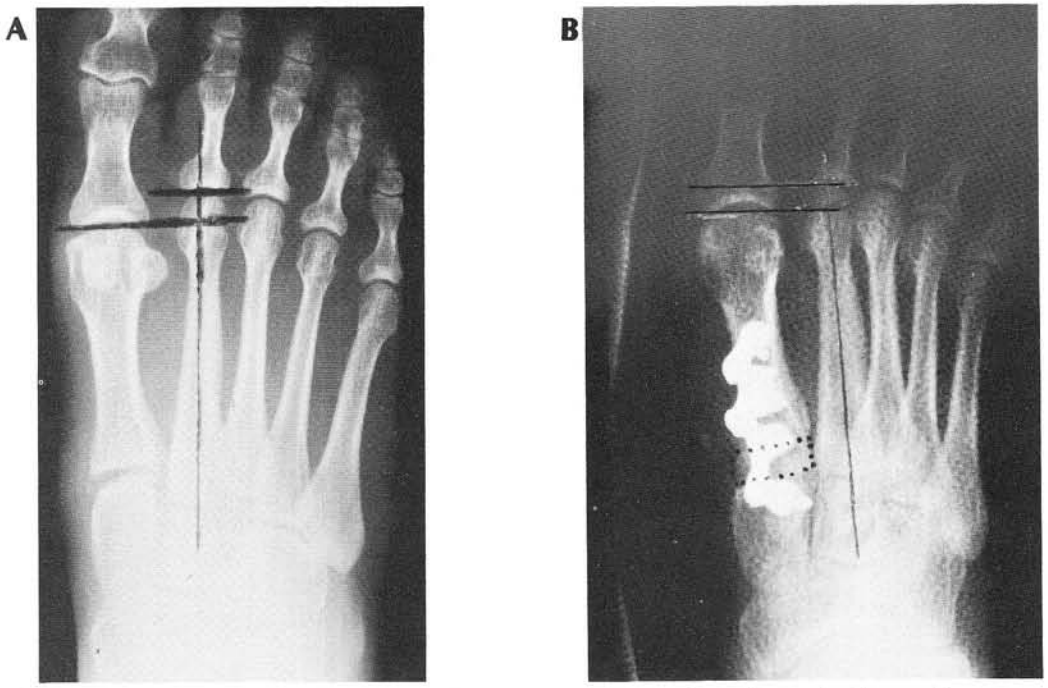

Fig. 5. Arthrodesis first MCJ with bone graft. A. preoperative and B. Postoperative radiographs. Note maintenance of length of first ray.

First metatarsocuneiform joint arthrodesis requires good fixation techniques. Compression fixation using the ASIF technique is employed. An attempt is made to avoid crossing other lesser tarsal joints with the fixation. Occasionally it is necessary to cross other lesser tarsal joints in order to facilitate screw purchase in osteoporotic states. These screws must be removed prior to extensive ambulation. Arthrosis may be induced by screws remaining in place across joints that have not been arthrodesed (Fig. 5).

SUMMARY

Appropriate assessment of the first metatarsocuneiform joint exostosis may result in adequate osseous resection but result in persistence of other soft tissue and joint complaints. Any condition affecting the first ray should receive a meticulous evaluation of the first metatarsocuneiform joint. The forthright approach to assessment through history and physical examination is recommended. Its use in first metatarsocuneiform joint exostosis is encouraged to help the practitioner make a careful thorough assessment. Only then is treatment logical and appropriately applied to one of a number of possible clinical situations.

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