

Preferred Practice Guidelines

Hallux Abductovalgus

Ingrown Toenails

Hammertoe Syndrome

Intermetatarsal Neuroma

Halluxlimitus & Hallus Rigidus

Heel Spur Syndrome

Metatarsalgia

Intractable Plantar Keratosis

Tailor's Bunion



The Academy Of Ambulatory Foot & Ankle Surgery

Preferred Practice Guidelines

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STANDARDS OF CARE

Terminology:

Ambulatory Podiatric Surgery Includes Minimal Incision Surgery, Minimally Invasive Surgery, Percutaneous Surgery And Other Podiatric Surgical Techniques Of The Foot And /Or Ankle.

Preoperative Care

1. Locale-Predominately practitioner's office and outpatient.
2. Laboratory Tests- Based on the patient's medical history and the doctor's clinical judgment. X-rays are recommended for bone surgery, weight bearing, partial weight bearing, or non-weight bearing. Radiological angles need not be physically measured and recorded if the surgeon deems a visual inspection of the x-ray adequate to his or her needs.
3. Scheduling-Surgery can be performed at any time and location on which the doctor and patient mutually agree.
4. Sterile Preparation-appropriate surgical scrub and draping of the surgical field depends upon the surgical technique utilized.
5. Sedation-Optional, depending upon type of procedure and patient's desires.
6. Anesthesia-Local and other forms of anesthesia may be administered by the doctor and/or appropriately trained personnel.
7. Serial Surgery-The staging of medical and/or surgical procedures, commonly referred to as serial surgery, may be indicated on certain conditions. The Academy of Ambulatory Foot and Ankle Surgery recognizes this as a mode of treatment, when a doctor and patient are in agreement.
8. Multiple Surgery-The performance of multiple medical and/or surgical procedures during any single treatment session is deemed by the Academy of Ambulatory Foot and Ankle Surgery as being proper and justifiable when the patient has multiple complaints. Patient history and examination, coupled with social clinical judgment, should augment this decision. Of course, both patient and doctor must mutually agree.

Intraoperative

9. Instrumentation-Specialized podiatric surgical instruments including side cutting Care bone scalpels (surgical burs) may be utilized.
10. Incision Size-Incision may vary from a puncture to a larger incision.
11. Sutures-Sutures or other specialized skin closures are at the discretion of the surgeon.
12. External Fixation-Bandage, Unna boot, splints, postoperative shoe, or cast may be employed. Internal fixation is not generally required and is at the discretion of the surgeon.

Postoperative

13. Oral Analgesics are often sufficient. Wet dressings may be utilized at the discretion of Care the surgeon, depending upon the nature of the procedure.
14. In the presence of a purulent or suspicious exudate, culture and sensitivity testing is indicated. Appropriate antibiotics should be utilized in the treatment of infections. Perioperative and/or prophylactic antibiotics may be utilized at the discretion of the surgeon. Localized purulent infections need only be cultured if there are appropriate risk factors present.
15. Medical Records-Entries on patient records may be handwritten, typed, or computerized and abbreviated depending on the office policy of the podiatrist who creates and utilizes the records. Standardized operative reports and postoperative instructions regarding routine surgical procedures are acceptable if the type of procedure is identified and any significant differences are included. It is not necessary to record every negative finding on every visit. There is no standardized type of charting that must be used. Medical charts should be accurate and reflect the actual care and treatment of the patient.

Originally adopted October, 1984

Most recent revision, October, 2004

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HALLUX ABDUCTOVALGUS

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I. Definition

Hallux abductovalgus is a deformity of the 1st metatarsal involving medial rotational deviation of the 1st metatarsal and/or an enlargement of the medial and/or dorsal prominence of the 1st metatarsal head with lateral or rotational deviation of the hallux.

II. Objectives of Treatment:

- A. Proper diagnosis
- B. Assessment of etiology
- C. Formulation of a treatment plan
- D. Explaining treatment options and educating the patient concerning these options (surgical and nonsurgical)
 - a. Conservative care, explain to the patient how they can accommodate for their condition
 - b. Surgical treatment
- E. Proper treatment and follow-up

III. Treating Podiatric Physician

The treating podiatric physician should be trained in the diagnosis and nonsurgical treatment of hallux valgus syndrome. Surgical treatment should be performed by one capable of managing the patient during preoperative, perioperative, intraoperative, and postoperative periods.

IV. Exacerbating or precipitating factors

- A.** Biomechanical fault
- B.** Trauma
- C.** Forefoot or rear foot imbalance
- D.** Tight shoes
- E.** Excessive walking
- F.** Surgery
- G.** Arthritis or inflammatory conditions
- H.** Cysts, nodes, bursae
- I.** Metatarsus adductus
- J.** Excessive pronation
- K.** Hereditary factors

V. Diagnosis

Hallux Abductovalgus diagnosis is made by completion of the history and physical exam and a lower extremity exam, subjective and objective findings, radiological evaluation and other diagnostic procedures.

A. History: This may include any of the following:

1. Chief complaint
2. Duration
3. Onset
4. Anything that improves or exacerbates
5. Any previous treatment
6. General medical history

7. Allergic condition
8. Medications taken
9. Surgical history
10. Family history
11. Social History

The Patient may be asymptomatic with a small bump, but some patients with mild deformities may have severe pain. Their lifestyle may be altered to the point that they may be unable to perform the activities that they would normally perform. Hallux abductovalgus may be caused by biomechanical abnormalities, and may be an inherited condition. Pressure from the shoe may also cause pain or neuritis and ulceration in the area.

B. Physical examination may include;

1. Vascular evaluation
2. Neurology exam
3. Orthopedic exam
4. Biomechanical exam
5. Dermatological exam

With a hallux abductovalgus deformity the great toe may or may not be deviated laterally. Hallux abductovalgus may be caused by biomechanical abnormalities that may lead to dysfunction in the first ray. There are numerous condition associated with hallux abductovalgus, and sometimes it is necessary to treat these associated conditions while treating the hallux abductovalgus deformity.

C. Concomitant conditions may include:

1. Overlapping or under lapping second toe
2. Metatarsalgia
3. Pain in the lesser digits
4. Contracture of the lesser digits
5. Plantar grade position of the adjacent metatarsal heads
6. Sesamoiditis
7. Dorsal Exostosis
8. Arthritic degeneration
9. Neuritis and/or Neuroma
10. EHL tendon contraction

D. Diagnostic procedure

1. Radiographic examination: X-rays must be taken.
They may be used to evaluate the type of deformity: soft tissue, osseous position deformity, structure deformity, joint destruction, sesamoid position. X-rays may be weight bearing, partial weight bearing, or non-weight bearing.
2. Laboratory testing may be used to rule out inflammatory disease, degenerative joint disease, systemic illnesses, etc.

VI. Reasons for Treatment of Hallux Valgus

A. Goals of treatment

1. Provide a reduction of the symptom and deformity and allow patient to maintain or return to a relatively normal activity level.

B. Nonsurgical treatment: Nonsurgical treatment will not correct a hallux valgus deformity. The purpose of nonsurgical treatment is to accommodate a patient with a symptomatic hallux valgus deformity. The only way to correct a hallux valgus deformity is with surgery.

C. Primary reasons for surgical treatment:

1. The patient wants the problem treated, not accommodated.
2. Nonsurgical methods of treatment have been unsuccessful.
3. The patient's foot has progressed to a point where there are other problems as a result of the bunion, such as pain in the bunion area, pain under the metatarsals, or hammertoes/flexion deformities.
4. The patient is unable to wear shoes or perform their normal activities. The patient must be informed of the risks and benefits, alternatives, and complications.

5. The patient is unable to tolerate the cosmesis of the deformity.
6. The patient wishes to prevent further deformity/degeneration.

VII. Types of Treatment

A. Nonsurgical treatment

1. Padding the area with bunion pads
2. Injection of local anesthetic, anti-inflammatory injections, cortisones, oral anti-inflammatories
3. Shoe medications (i.e. wider shoes, molded shoes)
4. Analgesics
5. Physical therapy
6. Orthotic treatment

B. Surgical Treatment

1. Partial removal of the medial side and/or dorsal aspect of the first metatarsal head. This is done with or without a soft tissue release.
2. Correcting the osseous deviation or subluxation of the joint. This may be performed with or without single or multiple osteotomies, or may be done with a Keller procedure.

VIII. Surgical Procedures for the Correction of the Hallux Valgus Deformity

- A. A soft tissue release with an ostectomy of the 1st metatarsal head

- B. Osteotomy at the proximal phalanx
- C. One or more osteotomies of the metatarsal
- D. A joint destruction procedure whereby an arthroplasty of the proximal phalanx is performed, with or without an implant
- E. A fusion along with the removal of the bump of the first metatarsal. At this time it may be necessary and indicated to surgically correct other deformities such as hammertoes, metatarsalgia, flexion deformities, and/or sesamoid pain

IX. Fixation

Fixation may be used at the discretion of the surgeon, and may be internal or external or not at all.

X. Site of Surgery

The surgical procedure is primarily performed in the doctor's office, but may also be done in the hospital or an ambulatory surgical center.

XI. Anesthetic

Local anesthetic is sufficient unless there are extenuating circumstances. IV sedation may or may not be utilized with this.

XII. Hemostasis

Absence of bleeding via tourniquet is not required and is not recommended with minimal incision surgery.

XIII. Surgical Preparation

Antiseptic preparation usually consists of antiseptic scrub pre-op, and sterile draping and technique.

XIV. Preoperative Lab

Need based on patients past medical history and current medical status.

XV. Prophylactic antibiotics

May be given at the discretion of the surgeon

XVI. Bilateral or multiple surgery

May be performed at the same surgical session or in different surgical sessions.

XVII. Postoperative Management

- A. X-rays are necessary to assess the progress of the osseous healing. They should be taken immediately postoperatively and may be indicated at intervals throughout the postoperative follow-up period, depending on the type of procedure performed and the wishes of the doctor. Non-weight bearing x-rays, weight-bearing x-rays taken at the angle and base of gait, or semi-weight bearing x-rays are acceptable. NWB, SWB, or WB x-rays are taken at the discretion of the surgeon.
- B. Postoperative immobilization may consist of casting, a splint, surgical shoe, a rigid sole shoe, or external splinting via gauze, tape, etc.
- C. Internal fixation or fixating devices are not required when doing bunion surgery, but may be used at the discretion of the surgeon when it is appropriate.

XVIII. Complications

- A. The deformity may reoccur or worsen
- B. Hallux varus
- C. Hallux elevatus (toe may not touch ground)
- D. Sesamoiditis
- E. Fusion of the joint
- F. Limited dorsiflexion and/or plantar flexion of toe
- G. Prolonged healing
- H. Metatarsalgia/transfer of weight
- I. Non-union/delayed union/malunion
- J. Vascular failure (gangrene)
- K. Nerve damage/Reflex sympathetic dystrophy
- L. Shortening of metatarsal and/or toe

XIX. Summary

The treatment and management of hallux valgus deformity encompasses a large variety of treatment and type of surgery from mild to radical, and is probably one of the most complex and controversial of all foot disorders to treat. Nonsurgical treatment of a bunion deformity will only accommodate or relieve symptoms. The only way to correct a bunion deformity is through surgical intervention. The podiatrist who performs this surgery must be skilled in preoperative, perioperative, and post operative management of this procedure. The doctor should use his/her education, training, and background in evaluating which type of procedure to use and what procedure will be most beneficial to the patient.

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INGROWN TOENAILS

I. Definition

Pain and inflammation adjacent to the margin of a toenail, infection may or may not be present.

II. Types of Ingrown Toenails

- A. Congenital An excessively wide nail plate with inflammation occurring in a person less than thirty six months
- B. Acquired Type I The nail plate is normal, but due to trauma to the nail area, the soft tissue becomes enlarged and pushes against the nail, thus causing inflammation.
- C. Acquired Type II. The nail plate is wider than normal and the nail grows down on one side.
- D. Acquired Type III There is a curvature on one or both sides of the nail, and the nail is ingrown on either or both the medial and lateral sides, causing inflammation in the soft tissue.
- E. Acquired Type IV There is interaction between the nail and the skin at the end of the toe. The toenail can not grow over the top of this skin out to the end of the toe.
- F. Acquired Type V A pincer-type ingrown nail. The toenail is curved excessively on both sides, and is pinching the skin underneath the nail. With this type of nail, one may find a bone spur (subungual exostosis) present.

III. Goals of Treatment

- A. Relieve pain

- B. Reduce the deformity
- C. Clear up the infection
- D. Permanently correct the deformity when possible

IV. Accomplishment of the goals

- A. Proper diagnosis
- B. Recognize etiology of the condition
- C. Treatment plan
- D. Treatment options
- E. Education of the patient
- F. Consultation if necessary (with the primary physician, family physician, or vascular surgeon)
- G. Proper treatment
- H. Appropriate follow-up care

V. Treating Physician

Treatment of ingrown toenails is a basic podiatric skill taught in podiatry school, which should be performed by a licensed podiatrist or other physician who has the skill to perform the procedure properly and is capable of managing the patient during the preoperative, perioperative, intraoperative and postoperative periods.

VI. Exacerbating/Precipitating Factors

- A. Improper trimming of toenails
- B. Biomechanical function
- C. Improper footwear and/or hosiery

- D. Trauma
- E. Heredity
- F. Subungual Exostosis
- G. Use of over the counter medicines
- H. Hypertrophic tissue adjacent to the nail
- I. Malformed nail
- J. Obesity/recent gain in weight/pregnancy
- K. Flexion deformities
- L. Under/over lapping toes

VII. Etiology

Many factors have been cited as the cause of ingrown toenails. These include:

- A. Wearing tight socks
- B. Improper cutting of the toenails
- C. Biomechanical Imbalance, i.e. flexion deformities
- D. Trauma
- E. Athletic Activity, i.e. tennis or jogging
- F. Rapid gain in weight. It has been observed that many women acquire ingrown toenails during pregnancy.
- G. Congenital factors. Some people are predisposed to ingrown toenails.

Their parents and grandparents had ingrown toenails and their children and grandchildren may have ingrown toenails.

VIII. Diagnosis

A. History: This should include evaluation of the chief complaint (including the degree, nature, location, duration, onset, and course of the pain.

Previous treatment and past medical history should be considered as well, especially if there is prior or family history of ingrown toenails, history of trauma, or previous history of infection.

B. Physical examination may include:

1. Peripheral vascular exam
2. Neurological exam
3. Orthopedic exam
4. Palpate (without hurting the patient)
5. Dermatological (i.e. infection/inflammation present)
6. Nail plate type
7. Muscle testing

C. Diagnostic Procedure

1. Gram Stain or culture and sensitivity may be performed in the presence of suspected infection.
2. X-rays may be indicated if the patient has:
 - a. Pain on downward or lateral pressure of the nail
 - b. Clinical evidence of and/or history of chronic infections
 - c. History of trauma to the toe
 - d. Patient has a pincer-shaped toenail
 - e. Clinical evidence of subungual exostosis

3. Vascular studies may be indicated if:
 - a. Patient has signs or symptoms of diminished circulation (i.e. lack of hair growth, shiny skin, rubor, absent or diminished pedal pulses).
 - b. Patient is a diabetic.

IX. Reasons for Treatment

A. Goals:

1. Relieve symptoms. Symptoms may range from mild to severe.
2. Return the patient to normal function. Loss of function may be minimal to extreme.

B. An untreated ingrown toenail may lead to loss of a toe (gangrene).

Treatment of the presenting pathology may range from conservative to surgical. Conservative treatment is primarily geared toward relieving the symptoms, whereas the goal of surgical treatment is not only to relieve symptoms, but to correct the underlying deformity and improve function as well. Depending on the situation at hand, conservative care may not be the treatment of choice.

C. Primary reasons for nonsurgical treatment:

1. The presence of any of the previously mentioned ingrown toenail deformities, either isolated or in combination with another, which results in a painful situation.
2. The patient cannot perform his/her normal activities.
3. When there may be associated pathology.
4. The patient is uncomfortable.
5. If there is a desire to prevent an anticipated problem.
6. Due to the patients health status surgery is contraindicated.
7. Impaired circulation
8. Diabetic (uncontrolled)

D. Primary reasons for surgical treatment:

1. The patient desires correction of the presenting deformity that is painful and causes a degree of loss of function. The patient has been informed of the alternatives, the reasonable foreseeable risks, complications and benefits.
2. Failure of nonsurgical treatment.
3. Impracticality of nonsurgical treatment because the patient has a history of chronic ingrown toenails or the patient has a family history of ingrown toenails.

X. **Treatment Definitions**

- A. Debridement of the toenail: involves the removal of the end of the toenail or grinding the top of the toenail. This is not a surgical procedure and in most cases will not require the use of an anesthesia.

- B. Avulsion of a toenail: involves the removal of the medial and/or lateral borders of the nail, or the total removal of the toenail.

XI. Types of Treatment

- A. Nonpermanent treatment—Initial treatment may consist of:

1. A simple nail avulsion with or without antibiotic treatment
2. Incision and drainage of the soft tissue adjacent to the nail
3. Simple nail avulsion with debridement of the adjacent soft tissue

- B. Surgical Procedure for Ingrown Toenails (These may be utilized alone or in combination.)

1. Treatment with chemicals such as phenol or sodium hydroxide
2. Surgical removal of the matrix
3. Laser and/or radio-wave matricectomy
4. Bone surgery is indicated with the treatment of ingrown toenails when there is pain with downward pressure, when there is a subungual exostosis present, or when there is osteomyelitis.
5. Treatment of the mild to moderate noninfected nail consists of avulsion of the offending portion of the nail and debridement of the nail if it is thick.
6. Repair of hypertrophic ungualabia

- C. With the above, patients may be instructed on:

1. Home soaks
2. Topical antibiotics
3. Oral antibiotics
4. Proper shoe gear
5. Proper trimming technique

XII. Site of Surgery

The surgical treatment of ingrown toenail syndrome is usually performed in the doctor's office. It may be performed in an ambulatory center or in a hospital if the patient has underlying problems or if the procedure is going to be performed in conjunction with other surgical procedures.

XIII. Anesthetic

Local anesthesia is sufficient unless there are extenuating circumstances.

XIV. Hemostasis

Hemostasis is desired when performing a matricectomy. This may be a tourniquet around the toe and/or anesthetic with epinephrine.

XV. Surgical Preparation

Usually aseptic scrub, prep, and draping are indicated.

XVI. Preoperative Lab

Usually not necessary, but may be indicated if the doctor suspects a systemic illness. This is based on the patient's medical history and his evaluation of the current medical status of the patient.

XVII. Prophylactic Antibiotics

At the discretion of the surgeon, unless the patient's medical history indicates a history of SBE, mitral valve prolapse, rheumatic fever, etc., at which time they should be given.

XVIII. Pathological Analysis

Pathological analysis of surgically removed tissue is recommended if suspected malignant condition exists. Mycology studies may be performed if onychomycosis is suspected.

XIX. Bilateral or Multiple Surgery

May be performed at the same surgical session or in different surgical sessions as musculoskeletal surgery an/or other nail surgery. It is acceptable to operate on both feet at the same time when it is mutually agreeable to the patient and the doctor.

XX. Infected Ingrown Toenail

With this condition a nail avulsion is indicated. Anesthesia may or may not be used. In severe cases, when the patient elects to have a matricectomy in conjunction with nail avulsion, anesthesia is necessary.

XXI. Matricectomy in the Presence of Infection or Inflammation:

Although there are no clear cut guidelines that exist concerning the performance of a matricectomy when there is concomitant inflammation or infection, there is wide spread performance of matricectomies when inflammation/infection are present, and therefore this has become an acceptable practice in podiatry.

XXII. Postoperative Complications

- A. Toenail may grow back
- B. Infection
- C. May have to have another surgery
- D. Prolonged drainage
- E. Clot
- F. Nail may get deformed
- G. Chemical reaction
- H. Inclusion cyst
- I. Gangrene
- J. Loss of toe
- K. Loss of limb
- L. Phlebitis

XXIII. Summary

There are many ways to treat an ingrown toenail. Conservative care which is nonsurgical or surgical treatment. The nonsurgical treatment basically accommodates the patient and will give them temporary relief, but the best way to insure that the ingrown toenail will not return is to treat the offending portion of the nail by avulsion with matricectomy and removal of the subungual exostosis or bone spur, when present. Prior to surgical intervention, proper preoperative surgical protocol should be followed and appropriate postoperative management follows the surgery.

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HAMMERTOES SYNDROME

HAMMERTOE SYNDROME

I. **Definition**

“Hammertoes” are a series of deformities that affect the digits of the feet.

Quite often a hyperkeratotic lesion (heloma) is involved. However, the condition also exists in the absence of such a lesion. The deformity may present as a situation affecting only the digit, or there may be proximal involvement from the metatarsophalangeal joint (joint contracture) as well. The presentation may be flexible, semirigid, or rigid.

II. **Types of Hammertoes**

- A. “Common” hammertoe: There is dorsiflexion of the proximal phalanx on the metatarsal, plantar flexion of the middle phalanx on the proximal, and dorsiflexion of the distal phalanx on the middle. Quite often, there is a lesion on the dorsal aspect of the head of the proximal phalanx. Due to vector forces going dorsal to the center of metatarsophalangeal joint, essentially a “metatarsus equinus” or plantar grade attitude of the metatarsal head occurs, possibly leading to pain and a hyperkeratotic lesion under the metatarsal head as well.
- B. Clawtoe: There is dorsiflexion of the proximal phalanx on the metatarsal head, plantar flexion of the middle phalanx on the proximal phalanx, and plantar flexion of the distal phalanx on the middle phalanx. A lesion may be found on the dorsal aspect of the head of the proximal phalanx, and/or the distal aspect of the distal phalanx.

- C. Mallet toe: There is a normal metatarsophalangeal joint, dorsiflexion of the middle phalanx on the proximal phalanx, and plantar flexion of the distal phalanx on the middle phalanx. When a lesion exists, it usually occurs on the dorsal aspect of the head of the middle phalanx, and/or on the tip of the toe.
- D. Overlapping fifth toe or digiti quinti varus: There is a varus rotation, and a dorsiflexion of the metatarsophalangeal joint, causing the fifth digit to lie on top of the adjacent fourth digit.
- E. Underlapping fifth toe (or other toe): With regards to the fifth toe, this is referred to as digiti quinti varus. Essentially this is a deformity that affects the distal interphalangeal joint (although the proximal interphalangeal joint may be involved as well). The affected digit is rotated in a varus attitude plantar to the adjacent digit.
- F. Exostosis/hypertrophied condyle: There is an enlarged or hypertrophied bony prominence around the joint(s) of the digit. There may or may not be an associated lesion.

III. **Goals and Objectives of Treatment**

- A. Relieve or reduce pain
- B. Reduce the deformity
- C. Eliminate lesions (or reduce severity)
- D. Arrest progression of deformity

IV. **Accomplishment of Goals**

- A. Proper diagnosis of the etiology of the condition

- B. Treatment plan, treatment options, and the education of the patient
- C. Consultation, if necessary
- D. Proper treatment follow-up/aftercare

V. **Treating Podiatric Physician**

The treating podiatric physician should be trained in the diagnosis and nonsurgical treatment of hammertoe syndrome. Surgical treatment should be performed by someone capable of managing the preoperative, perioperative, intraoperative, and postoperative periods.

VI. **Exacerbating/Precipitating Factors**

- A. Biomechanical fault
- B. Cavus foot
- C. Excessively pronated foot
- D. Trauma
- E. Neurological disease
- F. Arthritides or collagen disease
- G. Heredity
- H. Ill-fitting footwear

VII. **Etiology**

Hammertoe syndrome is either congenital or acquired with the former being the exception. The usual cause of hammertoe syndrome is a biomechanical fault, resulting in an abnormal muscle pull, affecting both the extrinsic and intrinsic musculature. Abnormal foot type (i.e. pes cavus), trauma, neurological disorders, and other conditions/situations affect the musculature

as well as the integrity of the metatarsophalangeal and interphalangeal joints and may also be causes of hammertoe syndrome. Hereditary factors may also influence the development of hammertoe syndrome.

VIII. Diagnosis

A. History: This may include any of the following:

1. An evaluation of the chief complaint (including the nature, location, duration, onset, course, anything that improves or exacerbates, and any previous treatment).
2. The past medical history (including allergies/medications, medical history, surgical history, family history, and social history).

B. Physical examination: The following may be important parts of the appropriate examination:

1. Peripheral vascular
2. Neurological
3. Orthopedic (involvement may be ascertained by examining the foot in either the weight bearing or non-weight bearing positions)
 - a. Palpation
 - b. Range of motion
 - c. Biomechanical/gait analysis
4. Dermatologic (presence of lesions or hyperkeratoses)

IX. Diagnostic Procedures

- A. Radiographic examination: X-rays must be taken. They may be used to evaluate the type of deformity as well as other factors. X-rays may be weight bearing, partial weight bearing, or non-weight bearing.
- B. Laboratory tests: Not required in the nonsurgical patient, unless underlying factors exist (i.e. infection or inflammatory disease)
- C. Additional tests (nerve conduction studies, EMG, noninvasive vascular testing). These studies may be utilized in isolated situations when deemed necessary.

X. Treatment of Hammertoe Syndrome

A. Goals of treatment:

The primary goals of treatment of hammertoe syndrome are the relief of symptomatology and the improvement of function. Symptoms may range from being quite mild to severe in nature. The loss of function can be minimal or extreme. Treatment of the presenting pathology can be either conservative or surgical in approach. Conservative (or nonsurgical) treatment is primarily geared to relieving symptomatology. The goal of surgical treatment is not only to relieve the symptoms(s), but to correct the underlying deformities and improve function of the patient, as well. Depending upon the presenting situation as hand and the wishes of the patient, conservative care may not be the approach of choice.

B. Reasons for treatment:

The presence of any of the previously mentioned hammertoe deformities, either isolated or in combination, which results in a painful or a non-painful

situation, where there is loss of function or inability to wear appropriate shoes.

There may be associated pathology such as inflammation (bursitis, capsulitis, or tendonitis), hyperkeratoses, infection, ulceration, joint disease, or biomechanical faults.

XI. Nonsurgical Treatment

A. The primary reasons for nonsurgical treatment are:

1. Due to the patients health status, surgery is contraindicated
2. The patient does not want surgery

B. Types of nonsurgical treatment:

1. Debridement
2. Padding
3. Shoe modifications
4. Oral anti-inflammatory medication (N.S.A.I.D.s)
5. Anti-inflammatory injectables
6. Orthotics
7. Orthodigital devices

XII. Surgical Treatment

A. The primary reasons for surgical treatment are:

1. Failure of nonsurgical treatment
2. Impracticality of nonsurgical treatment
3. The patient desires correction of a presenting deformity that is painful and/or causes a degree of loss of function.

4. The patient is informed of the procedure(s) to be performed, the treatment alternatives, and the reasonable risks involved and elects to have surgical intervention.
- B. Site of surgery: The surgical treatment of hammertoe syndrome is usually performed in the doctor's office; however, the hospital or an ambulatory surgical center may also be appropriate.
- C. Anesthesia: Local anesthesia is sufficient, unless there are extenuating circumstances. I.V. sedation may be administered with this.
- D. Hemostasis: Absence of bleeding is not required.
- E. Surgical preparation: Aseptic preparation ("usual" aseptic scrub, prep, draping, and sterility).
- F. Preoperative lab: May or may not be necessary based on the patients past medical history and current medical status.
- G. Prophylactic antibiotics: At the discretion of the surgeon (or based upon requirement: i.e. M.V.P.).
- H. Pathological analysis of surgically removed tissue: Recommended.
- I. Bilateral or Multiple Surgery: May be performed at the same surgical session, or in different surgical sessions.

XIII. Surgical Procedures for the Correction of Hammertoe Syndrome

Procedures may be performed as isolated situations or in conjunction with other procedures.

A. MPJ contractures

1. Extensor tendon lengthening

2. MPJ capsulotomy
3. Release of MPJ collateral ligaments
4. Flexor release
5. PiPJ arthroplasty (or proximal phalangeal osteotomy)
6. Associated metatarsal osteotomy or ostectomy
7. Exostosectomy

B. Flexible hammertoe

1. PiPJ arthroplasty
2. Flexor tendon lengthening/flexor tenotomy
3. Extensor tendon lengthening/tenotomy/MPJ capsulotomy
(Have been shown to be effective either as isolated procedures, or in conjunction with other procedures.)
4. Exostosectomy

C. Hammertoe (semirigid/rigid)

1. PiPJ arthroplasty
2. PiPJ arthrodesis
3. Exostosectomy
4. Diaphysectomy of the proximal phalanx
5. Middle phalangectomy
6. Soft tissues releases/lengthening

D. Clawtoe (flexible)

1. PiPJ arthroplasty
2. PiPJ arthrodesis

3. Exostosectomy
4. Extensor tendon lengthening/tenotomy
5. Flexor tendon lengthening/tenotomy
6. Capsulotomy

E. Clawtoe (semirigid/rigid)

1. PiPJ /DiPJ arthroplasty
2. PiPJ/DiPJ arthrodesis
3. Diaphysectomy of proximal and/or middle phalanx
4. Exostosectomy
5. Extensor tendon lengthening/tenotomy
6. Flexor tendon lengthening/tenotomy
7. Capsulotomy

F. Mallet toe (flexible)

1. DiPJ arthroplasty
2. Exostosectomy
3. Diaphysectomy of the middle phalanx
4. Flexor tendon lengthening/tenotomy
5. Capsulotomy

G. Mallet toe (semirigid/rigid)

1. DiPJ arthroplasty
2. Exostosectomy
3. Diaphysectomy of the middle phalanx
4. Flexor tendon lengthening/tenotomy

5. Capsulotomy

- H. Overlapping fifth toe

1. Extensor tendon lengthening/tenotomy
2. Capsulotomy (MPJ)
3. Skin-plasty
4. PiPJ arthroplasty
5. Metatarsal osteotomy
6. Diaphysectomy of the proximal phalanx
7. Tendon transfer

- I. Underlapping fifth (or other) toe

1. Arthroplasty
2. Diaphysectomy
3. Extensor tendon lengthening/tenotomy
4. Flexor tendon lengthening/tenotomy
5. Capsulotomy
6. Skin-plasty

- J. Exostosis or hypertrophied condyle (with or without interdigital heloma)

1. Exostosectomy
2. Arthroplasty

XIV. Postoperative Management

- A. Radiographs: Should be taken immediately following surgery.

Subsequent x-rays may be taken as the need arises.

- B. Postoperative visits: In the absence of complications, the patient should initially be seen within the first week following the procedure(s). Subsequent visits are determined by the procedures performed and the postoperative course.
- C. Weight bearing or immobilization Full weight bearing in a postoperative (surgical) shoe, regular shoe, or “cut out” shoe is indicated based upon the procedure(s) performed and on the individual patient. Generally, a surgical dressing is applied in the immediate postoperative period. This is modified with time and the postoperative course. The return to a normal shoe is based upon the procedure(s) performed and the postoperative course of the individual patient. Casting may be utilized, but it is not mandatory.
- D. Orthotics: May be helpful postoperatively.

XV. Postoperative Complications

- A. Edema
- B. Recurrence/regrowth
- C. Pain
- D. Numbness
- E. Stiffness
- F. Flailtoe
- G. Malposition
- H. Malunion/nonunion
- I. Infection

J. Gangrene

K. Vascular complications

L. Reflex Sympathetic Dystrophy

XVI. **Summary**

Hammertoe syndrome is a series of deformities that affect the toes of the feet. Treatment is initiated to relieve symptomatology, to correct the deformity, and to improve function. The treatment can be either conservative (nonsurgical) or surgical in nature. The choice of treatment is based upon the individual patient and the presenting pathology. If the surgical course is taken, there are several procedures that can be performed, either isolated or in conjunction, depending upon the pathology. Prior to surgical intervention, proper preoperative surgical protocol should be followed. Appropriate postoperative management follows surgery.

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INTERMETATARSAL NEUROMA

Intermetatarsal Neuroma

I. Definition

An intermetatarsal neuroma (also referred to as perineural fibrosis, Morton's neuroma, neurilemoma, interdigital neuroma, and traumatic neuroma) results from pressure, irritation, or injury to a common digital nerve, causing an accumulation of fibrous tissue or a thickening of the sheath of Schwann, which covers the nerve.

II. Causes of Intermetatarsal Neuromas

- A. Hypermobility of the metatarsals (possibly due to midtarsal and subtalar joint pronation), resulting in pressure or irritation to the nerve.
- B. Contracted toes: Contraction of toes puts stretch on nerve. The most common location is the third intermetatarsal space, but this may occur in any intermetatarsal space. The most common complaints from this are numbness, pain, and paresthesias. The symptoms in the early stages may be alleviated by removing the shoe and rubbing the affected area. Symptomatology is often increased by ambulation and activity. The pain can either be burning or sharp in nature. It can radiate, either proximally, distally, or plantarly, involving the MPJ area.
- C. Trauma

III. Goals and Objectives of Treatment

- A. Primary objectives of treatment are to:

1. Relieve or reduce pain
2. Reduce the deformity and improve function
3. Arrest the progression of the deformity

B. Goals may be accomplished through:

1. Proper diagnosis
2. Treatment of etiology of condition
3. Formulation of a treatment plan, consideration of all treatment options, and education of the patient
4. Consultation if necessary
5. Proper treatment follow-up/aftercare

IV. Treating Podiatric Physician:

The treating podiatric, allopathic, or osteopathic physician should be trained in the diagnosis of and nonsurgical treatment of an intermetatarsal neuroma.

Surgical treatment should be performed by someone capable of managing the preoperative, perioperative, intraoperative, and postoperative periods.

V. Exacerbating/Precipitating Factors

- A. Biomechanical
- B. Cavus foot
- C. Excessive pronation
- D. Trauma (repetitive or direct)
- E. Surgery
- F. Ill-fitting footwear (including high-heeled shoes)
- G. Arthritides or inflammatory states

H. Cysts, nodes/nodules, bursae in intermetatarsal space

VI. Diagnosis

A. History: This may include any of the following.

1. An evaluation of the chief complaint (including the nature, location, duration, onset, course, anything that improves or exacerbates, and any previous treatment).
2. The past medical history (including allergies, medications, medical history, surgical history, family history, and social history).

B. Physical examination may include:

1. Peripheral vascular
2. Neurological (are sensorium in the area intact or altered?)
3. Orthopedic

a. Palpation may produce:

- i. A palpable “click” (Mulder’s sign)
- ii. Pain/symptoms via lateral pressure
- iii. Digital splaying/juxtaposing
- iv. Palpable interdigital mass
- v. Pain upon palpation (Direct, to the intermetatarsal space)

b. Associated deformities

C. Diagnostic procedures may include:

1. Radiographic examination: X-ray examination may be used to rule out bony pathology (differential diagnosis). X-rays may be weight bearing, partial weight bearing, or non-weight bearing.
2. Laboratory test: used to rule out inflammatory disease, degenerative joint disease, systemic illness (again, differential diagnosis)
3. Electrodiagnostic studies: Possibly useful in ruling out other pathology (i.e. tarsal tunnel syndrome), but not definitive in establishing a diagnosis of intermetatarsal neuroma.
4. Current perceptual threshold (neurometer CPT test) may be used as indicated.
5. Ultrasound echography
6. MRI, C-T Scan or PET Scan

D. Differential diagnosis may include:

1. Fracture
2. Osteochondritis
3. Arthritis
4. Neoplasms (malignant/benign), nodules (i.e. rheumatoid)
5. Capsulitis
6. Bursitis
7. Tendonitis
8. Synovitis
9. Neuritis

10. Tarsal tunnel syndrome
11. Peripheral neuropathy
12. Reflex sympathetic dystrophy
13. Vascular insufficiency
14. Multiple neuromas may be present in the same foot

VII. Treatment of Intermetatarsal Neuroma

The primary goals of treatment of intermetatarsal neuroma are the relief of symptomatology and the improvement of function. Symptoms may range from being mild to quite severe in nature. The loss of function can be minimal or extreme. Treatment of the presenting pathology can be either conservative or surgical in approach.

VIII. Nonsurgical treatment

- A. Goals of treatment: Conservative (nonsurgical) treatment is primarily geared to relieving symptomatology. In most cases, conservative care should be utilized prior to surgery.
- B. Types of treatment:
 1. Padding and strapping (taping)
 2. Orthotics
 3. Shoe modifications
 4. Oral anti-inflammatory medications (N.S.A.I.D.s)
 5. Anti-inflammatory injectables (i.e. corticosteroids)
 6. Injection of local anesthetics (i.e. peripheral nerve block)
 7. Injection of sclerosing agents (i.e. Vitamin B-12, alcohol)

8. Analgesics

9. Physical therapy

IX. Surgical Treatment

- A. Goals of treatment: The goal of surgical treatment is not only to relieve the symptom(s), but to correct the underlying deformities, and to improve function as well.
- B. The primary reasons for surgical treatment are:
1. Failure of nonsurgical treatment
 2. Impracticality of nonsurgical treatment
 3. The patient desires correction of a presenting deformity that is painful and/or causes a degree of loss of function.
 4. The patient is informed of the procedure(s) to be performed, the treatment alternatives, and the reasonable risks involved, and elects to have surgical intervention.
- C. Site of surgery: The surgical treatment of intermetatarsal neuroma may be performed in the doctor's office. The hospital or an ambulatory surgical center may also be appropriate.
- D. Anesthesia: Local anesthesia is sufficient, unless there are extenuating circumstances. I.V. Sedation may also be utilized.
- E. Hemostasis: Absence of bleeding is not required, but may be utilized at the discretion of the surgeon.
- F. Surgical preparation: Aseptic preparation ("usual" aseptic scrub, prep, draping, and sterile technique).

- G. Preoperative lab: Necessity based upon the patient's past medical history and current medical status.
- H. Prophylactic antibiotics: At the discretion of the surgeon (or based upon requirement: i.e. M.V.P.).
- I. Pathological analysis of surgically removed tissue: Recommended.
- J. Bilateral or multiple surgeries: May be performed at the same surgical session, or in different surgical sessions.
- K. Second opinion: At the option of the patient or doctor.

X. Surgical Procedures for the Treatment of Intermetatarsal Neuroma

These may include:

- A. Neurectomy
 - 1. Excisional
 - 2. Electrocautery
 - 3. Radiocautery
 - 4. Laser
- B. Osteotomy of adjacent metatarsal(s) may be used for I.M.N. in the event that the metatarsal is malpositioned or malformed, and that the purpose of the osteotomy is for treatment of both the neuroma and the pathologic metatarsal as well.
- C. Tendon lengthening/tenotomy/capsulotomy may be used for I.M.N. in the event that the purpose of these procedures is both for treatment of the neuroma and the soft tissue pathology as well.
- D. Severing of the intermetatarsal ligament.

XI. Postoperative Management

- A. Radiographs: Necessary only if there is accompanying osseous and/or soft tissue surgery.
- B. Postoperative visits: In the absence of complications, the patient should initially be seen within the first week following the procedure(s). Subsequent visits are determined by the procedures performed and the postoperative course.
- C. Weight bearing/immobilization: Based upon the procedures performed and upon the individual patient, full, partial, or non-weight bearing may be utilized. A postoperative shoe may be indicated. Generally, a surgical dressing is applied in the immediate postoperative period. This is modified with time and the postoperative course. The return to a normal shoe is based upon the procedure(s) performed and the postoperative course of the individual patient. Casting is usually not necessary.

XII. Postoperative Complications

- A. Numbness
- B. Edema
- C. Recurrence
- D. Pain
- E. Digital or metatarsophalangeal joint instability
- F. Hemetoma
- G. Stump neuroma
- H. Infection

- I. Painful and/or hypertrophic scar formation
- J. Reflex sympathetic dystrophy
- K. Vascular complications
- L. Gangrene
- M. Fibrosis (intermetatarsal)
- N. Tissue necrosis
- O. Plantar fat pad atrophy

XIII. Summary

An intermetatarsal neuroma is a condition that occurs in the intermetatarsal space(s) of the foot. It is the result of pressure or irritation on a common digital nerve, thus causing an accumulation of fibrous tissue on the nerve.

Treatment is initiated to relieve symptomatology, to correct the deformity, and to improve function. The treatment can be either conservative (nonsurgical) or surgical in nature. The choice of treatment is based upon the individual patient and the presenting pathology. If the surgical course is taken, there are a limited number of surgical procedure alternatives. Prior to surgical intervention, proper preoperative surgical protocol should be followed.

Appropriate postoperative management should follow the surgery.

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HALLUX LIMITUS

&

HALLUX RIGIDUS

I. Definition

Hallux limitus is painful condition affecting the first metatarsal phalangeal joint. It is associated with painful motion, especially dorsiflexion. Usually one sees increased bone proliferation on the dorsal aspect of the proximal phalanx of the hallux and the head of the metatarsal with loss of dorsiflexion about the joint. Hallux rigidus is a more severe form of hallux limitus in which motion of the first metatarsal phalangeal joint is absent.

II. Objectives of Treatment

- A. Proper Diagnosis
- B. Assessment of etiology
- C. Formulation of a treatment plan
- D. Explaining treatment options and educating the patient concerning these options (surgical and nonsurgical)
 - a. Conservative care, explain to the patient how they can accommodate for their condition
 - b. Surgical treatment
- E. Proper treatment and follow-up, increased range of motion, pain-free joint fusion of the joint to decrease pain.

III. Treating Podiatric Physician

The treating podiatric physician should be trained in the diagnosis and nonsurgical treatment of hallux limitus and rigidus. Surgical treatment should

be performed by one capable of managing the patient during preoperative, perioperative, intraoperative, and postoperative periods.

IV. **Exacerbating or Precipitating Factors**

- A. Arthritis or inflammatory conditions
- B. Biomechanical fault
- C. Trauma
- D. Forefoot or rearfoot imbalance
- E. Tight shoes
- F. Excessive walking
- G. Surgery
- H. Cysts, nodes, bursae, or tumors
- I. Excessive pronation
- J. Hereditary factors

V. **Diagnosis**

Hallux limitus and rigidus diagnosis is made by completion of the history and physical exam, a lower extremity exam, subjective and objective findings, radiological evaluation and other diagnostic procedures.

A. History may include any of the following:

1. Chief complaint
2. Duration
3. Onset
4. Anything that improves or exacerbates
5. Any previous treatment

6. General medical history
7. Allergic condition
8. Medications taken
9. Surgical history
10. Family history
11. Social history

The patient may be asymptomatic for an extended period of time. They may have a mild deformity but have severe pain. Their lifestyle may be altered to the point that they may be unable to perform the activities that they would normally perform. Hallux limitus and rigidus may be caused by biomechanical abnormalities most commonly found in the rectus type foot. It may be an inherited condition. Pressure from the shoe may also cause pain or neuritis, and one may find ulceration under the sesamoids.

B. Physical examination may include

1. Vascular evaluation
2. Neurology exam
3. Orthopedic exam
4. Biomechanical exam
5. Dermatological exam

With hallux limitus and rigidus deformity you normally find pain with some degree of swelling and synovitis about the joint. As the condition progresses there is bony proliferation particularly around the dorsal aspect and lesser degree around the lateral aspect of the metatarsal head and this creates a

significant lip of the bone on the dorsal aspect of the metatarsal head and dorsal aspect of the base of the proximal phalanx. Rarely is significant bone formed around the medial aspect of the metatarsal head. The overall alignment of the joint is rarely altered as in hallux valgus or hallux varus. The dorsal impingement occurs around the base of the proximal phalanx and the head of the first metatarsal and limits the dorsiflexion of the hallux because of the bony prominence on the base of the head of the metatarsal. This results in pain initially with walking and sporting activities and is usually observed on the athlete earlier because of the more prominent dorsiflexion during athletic activities and with time one sees bulk about the joint.

C. Concomitant conditions may include

1. Metatarsalgia
2. Sesamoiditis primary
3. Dorsal exostosis
4. Arthritic degeneration
5. Neuritis and/or neuroma
6. Ulceration under the sesamoid
7. Synovitis
8. Tendonitis

D. Diagnostic procedure

1. Radiographic examination: X-rays should be taken. They may be used to evaluate the deformity: soft tissue, osseous position deformity, structure deformity, or joint destruction.

Radiographic findings are classic of degenerative arthritis of the first metatarsal phalangeal joint. The lateral x-ray is most useful since one can observe the dorsal lipping on the metatarsal head and periodically one can see the presence of loose fragments within the joint. AP radiographs demonstrate the extend of the lateral osteophyte as well at the degree of narrowing of the joint space. The sesamoids are rarely involved in the degenerative process until the later stages, and during the later stages the sesamoids are fused and the joint is inflamed. One can see fusion of the MP joint on the x-ray. X-rays may be weight bearing, partial weight bearing, or nonweight bearing.

2. Laboratory tests may be used to rule out inflammatory conditions such as rheumatoid arthritis or other degenerative diseases.

VI. Reasons for Treatment of Hallux Limitus and Rigidus

A. Goals of treatment

1. Provide a reduction of the symptoms and deformity and allow patient to maintain or return to a relatively normal activity level.

- B. Nonsurgical treatment: Nonsurgical treatment will not correct a hallux limitus or rigidus deformity. The purpose of nonsurgical treatment is to

accommodate a patient with asymptomatic hallux limitus or rigidus. The only way to correct a hallux limitus or rigidus deformity is with surgery.

VII. Types of Treatment

A. Nonsurgical treatment

1. Padding the area
2. Injection of local anesthetic, anti-inflammatory injections, cortisones, oral anti-inflammatories
3. Shoe modification (i.e. wider shoes, molded shoes), metatarsal bar, rocker bottom shoe
4. Oral analgesics and/or anti-inflammatory medications
5. Physical therapy
6. Orthotic therapy

B. Primary reasons for surgical treatment:

1. The patient wants the problem treated, not accommodated.
2. Nonsurgical treatments have been unsuccessful.
3. The patient's foot has progressed to a point where there are other problems as a result of the hallux limitus or rigidus, such as pain in the sesamoids or under the metatarsal head or ulceration.
4. The patient is unable to wear shoes or perform their normal activities. The patient must be informed of the potential risk and benefit, alternatives and complications.

5. The patient wishes to prevent further deformity or degeneration.

C. Types of surgical treatment

1. Arthrotomy and synovectomy
2. Cheilectomy. This is where you remove the bone on the dorsal aspect of the metatarsal head and/or the base of the proximal phalanx of the hallux and possibly one or more osteophytes. This increases the dorsiflexion and decreases the dorsiflexion of the metatarsal phalangeal joint and decreases the bulk of the joint.
3. A dorsiflexor wedge at the base of the proximal phalanx of the hallux
4. Dorsiflexor wedge osteotomy at or behind the neck of the first metatarsal
5. A step-down osteotomy such as a Chevron, Austin, or Wilson
6. Keller procedure
7. Keller procedure with an implant
8. Fusion of the MPJ (arthrodesis)

VIII. **Fixation**

Fixation may be used at the discretion of the surgeon, and may be internal or external or not at all with an osteotomy.

IX. **Site of Surgery**

The surgical procedure is primarily performed in the doctor's office, but may also be done in the hospital or an ambulatory surgical center.

X. Anesthetic

Local anesthetic is sufficient unless there are extenuating circumstances. IV sedation may or may not be utilized with this.

XI. Hemostasis

Absence of hemostasis via tourniquet is not required and is not recommended with minimal incision surgery, but may be used with a Keller type procedure or other traditional open surgical procedures.

XII. Surgical Preparation

Antiseptic preparation usually consists of antiseptic scrub pre-op and sterile draping and technique.

XIII. Preoperative Lab

Need based on patient's past medical history and current medical status.

XIV. Prophylactic Antibiotics

May be given at the discretion of the surgeon. In some cases, such as mitral valve prolapse, should be given prior to surgery.

XV. Bilateral or Multiple Surgery

May be performed at the same surgical session or in different surgical sessions.

XVI. Postoperative Management

A. X-rays may be necessary to assess the progress of the osseous healing.

They should be taken immediately postoperatively and may be indicated at

intervals throughout the postoperative follow-up period, depending on the wishes of the doctor. Non-weight bearing x-rays, weight bearing x-rays taken on the angle and base of gait, or partial weight bearing x-rays are acceptable. NWB, PWB, or WB x-rays are taken at the discretion of the surgeon.

- B. Postoperative immobilization may consist of casting, a splint, surgical shoe, a ridged sole shoe, or external splinting via gauze, tape, etc.
- C. Internal fixation or fixating devices are generally not required when doing hallux limitus or rigidus type procedures, but may be used at the discretion of the surgeon when it is appropriate.

XVII. Complications

- A. The deformity may recur or worsen
- B. Hallux valgus
- C. Hallux varus
- D. Hallux elevatus (toe may raise up too much)
- E. Sesamoiditis
- F. Fusion of the joint
- G. Limited dorsiflexion and/or plantar flexion of toe
- H. Prolonged healing
- I. Metatarsalgia
- J. Non-union/delayed union/malunion
- K. Vascular failure (gangrene)
- L. Nerve damage/reflex sympathetic dystrophy

M. Shortening of metatarsal and/or toe

N. Infection

XVIII. **Summary**

The treatment and management of hallux limitus and rigidus deformity encompasses a large variety of treatment plans and one of the most challenging procedures to the podiatric surgeon. Nonsurgical treatment of hallux rigidus will not cure the deformity, but will only accommodate it and relieve the symptoms in some cases. The only way to correct a hallux limitus or rigidus deformity is by surgical intervention. The podiatrist who performs this surgery must be skilled in preoperative, perioperative, and postoperative management of this procedure. The doctor should use his education, training, and background in evaluating which type of procedure to use and what procedure will be most beneficial to the patient.

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HEEL SPUR SYNDROME

HEEL SPUR SYNDROME

I. Definition

Heel pain is a myriad of conditions, affecting the plantar and posterior aspects of the heel, resulting in varying degrees of discomfort (pain). The most common of these conditions is the inferior calcaneal exostosis, or “heel spur,” which in the painful state is accompanied by inflammation of the plantar fascia (i.e. plantar fasciitis). This is quite often referred to as “heel spur syndrome.”

II. Etiology of Heel Spur Syndrome

A. Situations that result in an abnormal pull on the plantar fascia

1. Pronatory conditions (In a pronated foot, the distance between the heel and the metatarsals is increased, therefore a stretch is placed on the plantar fascia, giving rise to an irritation at its insertion on the calcaneus.)
2. Cavus foot
3. Hammertoes
4. Contracted flexor or extensor tendons

B. Obesity

C. Occupation

D. Trauma

III. Goals and objectives of Treatment

- A. Relieve or reduce pain
- B. Reduce the deformity
- C. Improve function
- D. Arrest the progression of the deformity

IV. Accomplishment of Goals

- A. Proper diagnosis
- B. Treatment of etiology of the condition
- C. Treatment plan, treatment options, education of the patient
- D. Consultation, if necessary
- E. Proper treatment follow-up/aftercare

V. Treating Podiatric Physician

The treating podiatric physician should be trained in the diagnosis and nonsurgical treatment of heel spur syndrome. Surgical treatment should be performed by someone capable of managing the preoperative, perioperative, intraoperative, and postoperative periods.

VI. Exacerbating or precipitating factors

- A. Biomechanical fault
- B. Cavus foot
- C. Excessively pronated foot
- D. Trauma (repetitive or direct)
- E. Obesity
- F. Neurological disease
- G. Arthritides

H. Ill-fitting footwear (including high-heeled shoes)

I. Heredity

VII. Diagnosis

A. History may include any of the following:

1. An evaluation of the chief complaint (including the nature, location, duration, onset, course, anything that improves or exacerbates, and any previous treatment).
2. The past medical history (including allergies/medications, medical history, surgical history, family history, and social history).

B. Physical examination may include:

1. Peripheral vascular
2. Neurological
3. Orthopedic
 - a. Palpation(direct/lateral pressure)
 - b. Biomechanical/gait analysis
 - c. Range of motion

VIII. Diagnostic Procedures

A. Radiographic examination: X-rays should be taken. They are necessary to confirm/rule-out bony pathology. X-rays may be weight bearing, partial weight bearing, or non-weight bearing. Ultrasound echographic examination may be utilized with this at the discretion of the doctor.

- B. Laboratory tests: Used to rule out inflammatory disease, infection, degenerative joint disease, systemic illness, etc.
- C. Additional tests (nerve conduction studies, EMG, noninvasive vascular testing): These studies may be utilized in isolated situations when deemed necessary.
- D. Differential diagnosis may include:
 - 1. Plantar fasciitis without spur formation
 - 2. Bursitis (inferior or retrocalcaneal)
 - 3. Tendonitis
 - 4. Osteochondritis
 - 5. Periostitis
 - 6. Arthritis
 - 7. Fracture
 - 8. Neoplasms (malignant/benign)
 - 9. Neuritis
 - 10. Tarsal tunnel syndrome
 - 11. Neuroma
 - 12. Peripheral neuropathy
 - 13. Herniation of the plantar fat pad
 - 14. Haglund's deformity
 - 15. Infection (i.e. osteomyelitis, soft tissue)
 - 16. Gout
 - 17. Reflex sympathetic dystrophy

18. Vascular insufficiency

19. Systemic illness

20. Medication induced (i.e. patients on thiazide diuretics)

IX. Treatment of Heel Spur Syndrome

A. Goals of treatment:

The primary goals of treatment are the relief of symptomatology and the improvement of function. Symptoms may range from being mild to quite severe in nature. The loss of function can be minimal or extreme.

Treatment of the presenting pathology can be either conservative or surgical in approach.

X. Nonsurgical Treatment

A. Goals of treatment:

Conservative (nonsurgical) treatment is primarily geared to relieving symptomatology. In most cases, conservative care should be considered prior to surgery.

B. Types of treatment:

1. Padding and strapping (taping)
2. Orthotics
3. Heel cup
4. Shoe modifications
5. Oral anti-inflammatory medications (NSAIDs)
6. Anti-inflammatory injectables (i.e. corticosteroids)
7. Injection of local anesthetics (i.e. peripheral nerve block)

8. Analgesics
9. Physical therapy
10. Extracorporeal Shockwave therapy

XI. Surgical Treatment

A. Goals of treatment:

The goal of surgical treatment is not only to relieve the symptom(s), but to correct the underlying deformities and to improve function as well.

B. The primary reasons for surgical treatment are:

1. Failure of nonsurgical treatment
2. Impracticality of nonsurgical treatment
3. The patient desires correction of a presenting deformity that is painful and/or cause a degree of loss of function
4. The patient is informed of the procedure(s) to be performed, the treatment alternatives, and the reasonable risks involved, and elects to have surgical intervention

C. Site of surgery:

The surgical treatment of heel spur syndrome may be performed in the doctor's office. The hospital or an ambulatory surgical center may also be appropriate.

D. Anesthesia:

Local anesthesia is sufficient, unless there are extenuating circumstances.

I.V. sedation may be utilized with this.

E. Hemostasis:

Absence of bleeding is not required via tourniquet, but may be utilized at the discretion of the surgeon.

F. Surgical preparation:

Aseptic preparation (“usual” aseptic scrub, prep, draping, and sterile technique)

G. Preoperative lab:

Necessity based upon patient’s past medical history and current medical status

H. Prophylactic antibiotics:

At the discretion of the surgeon (or based upon requirement: I.E. MVP)

I. Pathological analysis of surgically removed tissue is recommended.

J. Bilateral or multiple surgeries may be performed either at the same surgical session or in different surgical sessions.

K. Second opinion:

At the option of the patient or doctor

XII. Surgical Procedures for the Treatment of Heel Spur Syndrome

These may include one or more of the following:

A. Resection of inferior or calcaneal exostosis with plantar fasciotomy

B. Plantar fasciotomy as an isolated procedure (i.e. endoscopic, MIS, or traditional approaches)

C. Calcaneal decompression

D. Tendon lengthening/tenotomy/capsulotomy may be used for heel spur syndrome in the event that the purpose of these procedures is both for

treatment of the heel spur syndrome and the “hammertoe syndrome” as well.

- E. Autologous fat transfer

XIII. Postoperative Management

- A. Radiographs: Should be taken immediately following surgery if osseous surgery has been performed. Additional x-rays as needed.
- B. Postoperative visits: In the absence of complications, the patient should initially be seen within the first week following the procedure(s). Subsequent visits are determined by the procedures performed and the postoperative course.
- C. Weight bearing/immobilization: Based upon the procedures performed and upon the individual patient, full, partial, or non-weight bearing may be utilized. Generally, a surgical dressing is applied in the immediate postoperative period. This is modified with time and the postoperative course. A postoperative shoe is usually indicated. Casting may or may not be necessary. The return to a normal shoe is based upon the procedure(s) performed and the postoperative course of the individual patient.
- D. Orthotics: May be prescribed to improve biomechanics.

XIV. Postoperative Complications

- A. Numbness
- B. Edema
- C. Pain

- D. Recurrence
- E. Hematoma
- F. Infection
- G. Painful and/or hypertrophic scar formation
- H. Adhesions
- I. Vascular complications
- J. Reflex sympathetic dystrophy
- K. Fracture
- L. Gangrene
- M. Tissue necrosis

XV. Summary

Heel pain is a group of conditions affecting the plantar and posterior aspects of the heel, causing a varying amount of discomfort or pain. The most prevalent of these conditions is “heel spur syndrome.” This is most often caused by an increased stretch on the plantar fascia at its insertion on the calcaneus, the result of a biomechanical fault. Treatment is initiated to relieve symptomatology, to correct the deformity, and to improve function. The treatment can be either conservative (nonsurgical) or surgical in nature. The choice of treatment is based upon the individual patient and the presenting pathology. If the surgical course is taken, there are a limited number of surgical procedure alternatives. Prior to surgical intervention, proper preoperative surgical protocol should be followed. Appropriate postoperative management should follow the surgery.

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METATARSALGIA

INTRACTABLE

PLANTAR

KERATOSIS

TAILOR'S BUNION

METATARSALGIA/INTRACTABLE PLANTAR KERATOSIS/TAILOR'S**BUNION****I. Definition**

“IPKs” are a series of deformities that include the plantar surface (aspect) of the foot beneath the metatarsals (1-5). Metatarsalgia does not necessarily include a callosity. When the condition involves the fifth metatarsal, (a Tailor’s bunion) the lateral aspect, and possibly the dorsal aspect of the foot may be involved.

- A. A callus is a hypertrophic growth on the plantar surface of the foot which may be flat or may be deep (nucleated). It results from excessive pressure derived from an abnormality in a single or in multiple metatarsals.
- B. Metatarsalgia is a painful condition implying pain in the metatarsal head (MPJ) area of the foot. It may involve a single or multiple metatarsals.
- C. Tailor’s bunion is a painful condition involving the fifth metatarsal. It usually results in callus beneath, lateral to and sometimes dorsal to the fifth metatarsal head. It is associated with a deformity of the fifth metatarsal in which there is lateral splaying of the fifth metatarsal and/or a hypertrophic lateral condyle of the fifth metatarsal.

II. Diagnosis

- A. History: This may include any of the following:

1. An evaluation of the chief complaint (including the nature, location, duration, onset, course, anything that improves or exacerbates, and any previous treatment).
2. The past medical history (including allergies/medications, medical history, surgical history, family history, and social history).

B. Physical examination: The following may be important parts of the appropriate examination:

1. Peripheral vascular
2. Neurological
3. Orthopedic (involvement may be ascertained by examining the foot in either the weight bearing or non-weight bearing positions)
 - a. Palpation
 - b. Range of motion
 - c. Biomechanical/gait analysis
4. Dermatologic (presence of lesions or hyperkeratoses)

III. Diagnostic Procedures

- A. Radiographic examination: X-rays should be taken. They may be used to evaluate the type of deformity as well as other factors. X-rays may be weight bearing, partial weight bearing, or non-weight bearing.
- B. Laboratory test: Not required in the nonsurgical patient, unless underlying factors exist (i.e. infection or inflammatory disease). Blood and urine tests

may be indicated for the surgical patient at the discretion of the surgeon based on the patients medical history.

- C. Additional tests (nerve conduction studies, EMG, noninvasive vascular testing). These studies may be utilized in isolated situations when deemed necessary.

IV. Etiology

Metatarsalgia, IPK, and Tailor's bunions are either acquired or congenital. IPK and metatarsalgia are usually caused by a deformity of one or more of the metatarsals. It can involve prolapse of the metatarsal(s), hypertrophy of the metatarsal(s) (head and shaft), elongation of the metatarsal(s), shortness of the metatarsal(s), and/or enlargement of a plantar condyle of the metatarsal head(s). It may be accompanied by cyst formation in the plantar tissues, neuroma, hammertoe formation, and/or contracture of the MPJ and dorsal extensor apparatus, cavus foot, forefoot equines (local or global), and various neurological conditions. IPK may result from a scar, following an injury, or post metatarsal fracture.

V. Exacerbating/Precipitating factors

- A. Biomechanical fault
- B. Pronated foot
- C. Cavus foot
- D. Trauma
- E. Heredity
- F. Hammertoes

- G. Ill-fitting shoes
- H. Neurological disease
- I. Plantar fat pad atrophy
- J. Arthritis

VI. Goals and Objectives of Treatment

- A. Relieve or reduce pain
- B. Reduce the deformity
- C. Eliminate lesions (or reduce severity)
- D. Arrest progression of deformity

VII. Accomplishment of Goals

- A. Proper diagnosis of the etiology of the condition
- B. Treatment plan, treatment options, and the education of the patient
- C. Consultation, if necessary
- D. Proper treatment follow-up/aftercare

VIII. Treating Podiatric Physician

The treating podiatric physician should be trained in the diagnosis and nonsurgical treatment of metatarsalgia, IPK, and Tailor's bunion. Surgical treatment should be performed by someone capable of managing the preoperative, perioperative, intraoperative, and postoperative periods.

IX. Treatment of Metatarsalgia, IPK, and Tailor's Bunion

- A. Goals of Treatment:

The primary goals of treatment are the relief of symptomatology and the improvement of function. Symptoms may range from being quite mild to

severe in nature. The loss of function can be minimal or extreme.

Treatment of the presenting pathology can be either conservative or surgical in approach. Conservative (or nonsurgical) treatment is primarily geared to relieving symptomatology. The goal of surgical treatment is not only to relieve the symptom(s), but to correct the underlying deformities and improve function of the patient, as well. Depending upon the presenting situation at hand and the wishes of the patient, conservative care may not be the approach of choice.

B. Reasons for treatment:

The presence of any of the previously mentioned deformities, either isolated or in combination, which results in a painful or a non-painful situation, where there is loss of function or inability to wear appropriate shoes. There may be associated pathology such as inflammation (bursitis, capsulitis, or tendonitis), hyperkeratoses, infection, ulceration, joint disease, or biomechanical faults.

X. Nonsurgical Treatment

A. The primary reasons for nonsurgical treatment are:

1. Due to the patients health status, surgery is contraindicated
2. The patient does not want surgery

B. Types of nonsurgical treatment:

1. Debridement
2. Padding
3. Shoe modifications

4. Oral anti-inflammatory medication (NSAIDs)
5. Anti-inflammatory injectables
6. Orthotics

XI. Surgical Treatment

A. The primary reasons for surgical treatment are:

1. Failure of nonsurgical treatment
2. Impracticality of nonsurgical treatment
3. The patient desires correction of a presenting deformity that is painful and/or causes a degree of loss of function.
4. The patient is informed of the procedure(s) to be performed, the treatment alternatives, and the reasonable risks involved and elects to have surgical intervention.

B. Site of surgery: The surgical treatment of metatarsalgia, IPKs, and Tailor's bunion is usually performed in the doctor's office; however, the hospital or an ambulatory surgical center may also be appropriate.

C. Anesthesia: Local anesthesia is sufficient, unless there are extenuating circumstances.

D. Hemostasis: Absence of bleeding is not required.

E. Surgical preparation: Aseptic preparation (usual" aseptic scrub, prep, draping, and sterility).

F. Preoperative lab: May or may not be necessary based on the patients past medical history and current medical status.

G. Prophylactic antibiotics: At the discretion of the surgeon (or based upon requirement: I.e. MVP).

H. Pathological analysis of surgically removed tissue: Recommended.

I. Bilateral or Multiple Surgery: May be performed at the same surgical session, or in different surgical sessions.

XII. Surgical Procedures for the Correction of Metatarsalgia/IPK/Tailor's Bunion

Procedures may be performed as isolated situations or in conjunction with other procedures.

A. Metatarsal osteotomy may be:

1. Percutaneous
2. Transverse, “v” shaped, or bi- or tri- plane
3. Partial or “through and through”

B. Excision of all or part of a metatarsal head and/or shaft may be performed at appropriate times to treat these conditions.

C. Intramedullary decompression (IMDC)

XIII. Fixation

Fixation may be via internal, percutaneous, or external means such as casts, splints, surgical shoes, or adhesive forms of dressings. Internal fixation is generally not required and is at the discretion of the surgeon.

XIV. Postoperative Management

The patient may ambulate during the recovery period. X-rays should be taken postoperatively and may be taken thereafter to assess the healing.

Postoperative foot gear may include a surgical shoe or other form of restrictive footwear.

Generally, a surgical dressing is applied in the immediate postoperative period. This is modified with time and the postoperative course. The return to a normal shoe is based upon the procedure(s) performed and the postoperative course of the individual patient. Orthotics may be useful postoperatively.

XV. Postoperative Complications

- A. Edema
- B. Recurrence/re-growth
- C. Pain
- D. Numbness
- E. Stiffness
- F. Shortening of digits/metatarsals
- G. Malposition
- H. Nonunion
- I. Delayed union
- J. Transfer lesions
- K. Vascular complications
- L. Reflex sympathetic dystrophy

XVI. Summary

Metatarsalgia/intractable plantar keratosis/Tailor's bunion comprise a series of conditions arising from abnormal pressure from the metatarsals upon the skin

the foot. It may be caused by a number of deformities of the metatarsals and may be associated with inherent orthopedic, biomechanical, and neurological conditions. Treatment is initiated to relieve symptomatology, to correct the deformity, and to improve function. The treatment can be either conservative

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