



**Myths, Facts and Fables**  
*Musings on Foot Health*

**David R Tollafield**

*Editor ConsultingFootPain*

Myths, Facts and Fables – *Musings on the Foot*

All rights reserved. Do not resell, reproduce or distribute this work in whole or part without written permission.

Busypencilcase Communications Ltd  
Cover shutterstock.com/g/gwoeii  
© 2021



**PDF FREE VERSION FROM CONSULTINGFOOTPAIN  
NOT FOR RESALE**

This book has been produced exclusively for readers of ConsultingFootPain. It will be also be released in e-book format and paperback cover. The content may vary between the published editions.

All photos are licensed through Shutterstock.com or from the author's personal library and are strictly bound by copyright

David R Tollafeld

*FOR READERS WHO SEEK OUT THE WONDERS OF THE FOOT*

SCIENCE CAN EXPLAIN THE TRUTH WHERE SCIENTIFIC METHOD IS DEVOID OF BIAS.

THE AUTHOR

## Preface

A massive marketplace exists that drives health. The quest for information amongst the population of most educated countries is vast—most of what we read aims at providing information with adverts. Enduring lengthy articles that focus on selling can lead to frustration. It may not be that such material is of limited value, but we all have little time to read. The other problem presenting the reader is how to navigate between good and bad advice, positive and negative, sales pitch and the genuine article? Lastly and the reason for this small book relates to how much foot health is a myth. Fables pass from generation to generation.

One might ask who is this book written for? My answer is anyone and everyone who has an interest in feet and foot health. The content aims at the lay reader. I believe that detailed material is within reach of many. The basis of the book comes from my own experience in the field of foot health science and the profession of podiatry.

I have written more than 150 articles with colleagues, and we have tried to demystify some of the science and remove some prejudices. Where information is not published from personal experience, references to material, YouTube films, articles and scientific papers make up the content of ConsultingFootPain's resources. It is important that the reader can trust each source.

This book covers common conditions we all know about and even joke about. Sweaty feet, chilblains, ingrown toe nails are all too commonly thought of as disorders of no consequence. Attitudes toward the care of such ailments are even more bizarre. Having given talks on foot health over the years, both at home and abroad, I have introduced some of these topics to audiences from village halls to conference centres into this book. Many readers will not be aware of the diversity of foot conditions.

Having researched the subjects and applied my knowledge, I am astonished at what some authors publish. If the method of management was confusing before, some make the condition even more perplexing. The reader will need to weed out the chaff and seek out their requirements. As a communicator, I hope this little book will be of value. The style intends to be light, the intention to engage by providing a meaningful scientific explanation.

I would like to share some of my own experiences as a foot health specialist over 40-years. This book is fully referenced and has a content list together with an index.

You will find more information on my free resource site [www.consultingfootpain](http://www.consultingfootpain) and all are welcome to receive my free e-newsfeed by *signing-up* on my landing page. Other books covering foot health are available from Amazon and listed on the last page.

Thanks for reading this book. If you like the content, please write to me with any queries at [busypencilcasecfp@gmail.com](mailto:busypencilcasecfp@gmail.com). I love to quote your comments. If you have any criticisms or desire for improvement then don't be shy, tell me. At the end of the day we all practise reflectively.

**David R Tollafield, June 2021**

FCPodS, MSc, BSc, DPodM, FCPodM

# ConsultingFootPain



**A FREE WEBSITE BASED RESOURCE FOR ALL**

When I was awaiting to go to University College Hospital (London Foot Hospital) I asked for a reading list ahead of my admission. That was in 1974. The list consisted five of the most elusive texts ever written. To comprehend the poorly constructed text was one concern. The content was hardly motivating to an 18-year old school leaver. The second concern was the fact that the books were divorced from the subject I was waiting to study for three years. This book may help to shine some light on one of the most engaging professions that exists in health care – podiatry.

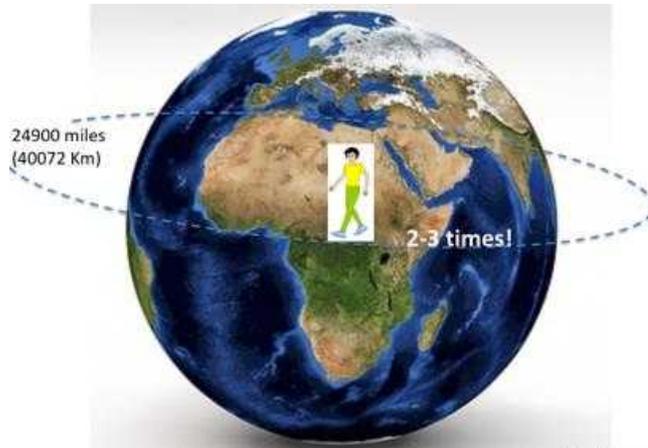
Today, in the 21<sup>st</sup> century, few books exist within the UK on the subject of foot health given the fact that foot health science is so rich. I pay tribute to my many US colleagues who understand the need to ensure their profession is charted and promoted so effectively.

## Content

<b>PREFACE</b> .....	<b>4</b>
<b>CONTENT</b> .....	<b>6</b>
<b>A BIT OF OVERVIEW</b> .....	<b>8</b>
<b>DAMAGING THE BODY</b> .....	<b>8</b>
<b>PREVIOUS INJURY</b> .....	<b>9</b>
<b>FOOT BONES</b> .....	<b>11</b>
<b>THE TALUS</b> .....	<b>11</b>
<b>HOW MANY BONES ARE IN A FOOT?</b> .....	<b>12</b>
<b>ACCESSORY BONES</b> .....	<b>12</b>
<b>SESAMOID BONES</b> .....	<b>12</b>
<b>IS THE SESAMOID BONE CALLED ‘LUZ’?</b> .....	<b>13</b>
<b>IS PEDICURE THE SAME AS CHIROPODY?</b> .....	<b>14</b>
<b>WHERE DOES THE CONFUSION LIE?</b> .....	<b>14</b>
<b>IS THERE AN OVERLAP BETWEEN PEDICURE AND PODIATRY?</b> .....	<b>14</b>
<b>WHO DEALS WITH FEET IN THE UK?</b> .....	<b>15</b>
<b>WHAT’S A BUNION? I THOUGHT ONLY OLDER PEOPLE GET THESE!</b> .....	<b>16</b>
<b>HOW DO WE KNOW IF IT IS A BUNION?</b> .....	<b>16</b>
<b>GANGLIA - CAN A HEAVY BOOK PROVIDE EFFECTIVE TREATMENT?</b> .....	<b>17</b>
<b>METATARSALGIA</b> .....	<b>18</b>
<b>SEX DIFFERENTIATION</b> .....	<b>18</b>
<b>WHO’S NAME WAS IT REALLY?</b> .....	<b>19</b>
<b>SO WHERE DOES THE NEUROMA LIE?</b> .....	<b>19</b>
<b>DOES IT MATTER HOW WE RECORD DATA?</b> .....	<b>19</b>
<b>IS THERE A TRUE NEUROMA IN THE 2-3<sup>RD</sup> TOE SPACE?</b> .....	<b>20</b>
<b>COULD FOOT SHAPE CAUSE MORTON'S NEUROMA?</b> .....	<b>20</b>
<b>ANCIENT STATUES</b> .....	<b>21</b>
<b>CAN FOOT ORTHOSES HELP NEUROMA?</b> .....	<b>21</b>
<b>THE ARCH &amp; THE ARMY</b> .....	<b>22</b>
<b>AN OBSESSION WITH ARCHES</b> .....	<b>22</b>
<b>TRANSVERSE ARCH</b> .....	<b>24</b>
<b>FLEXIBLE FOOT</b> .....	<b>24</b>
<b>DO WE NEED TO 'JACK UP THE ARCH'?</b> .....	<b>25</b>
<b>ORTHOSES AND THE ARCH</b> .....	<b>25</b>
<b>ANTERIOR (TRANSVERSE) ARCH</b> .....	<b>26</b>
<b>FOOTWEAR CLUES</b> .....	<b>26</b>
<b>CAN PODIATRISTS HELP THE POLICE SOLVE CRIME?</b> .....	<b>27</b>
<b>BUNION VERSUS HALLUX VALGUS? CONFLICTING OPINIONS!</b> .....	<b>28</b>
<b>EVIDENCE TO REBUT FOOTWEAR AS A CAUSE OF BUNIONS</b> .....	<b>28</b>
<b>IS THERE EVIDENCE TO SUGGEST FOOTWEAR DOESN’T CAUSE BUNIONS?</b> .....	<b>29</b>
<b>TOE SPLINTS AND SEPARATORS FOR HALLUX VALGUS</b> .....	<b>30</b>

<b>IF YOUR PARENTS HAD A BUNION, WILL YOU GET ONE? .....</b>	<b>31</b>
<b>HOW BAD CAN A BUNION (HALLUX VALGUS) GET? .....</b>	<b>32</b>
<b>FOOTWEAR AND MARTYRDOM WITH FEET .....</b>	<b>33</b>
<b>WIDE SHOES.....</b>	<b>33</b>
<b>NARROW-POINTED SHOES.....</b>	<b>33</b>
<b>THE MYTH FROM THE GRAVE .....</b>	<b>34</b>
<b>ARE HIGH HEELED SHOES A NEW FASHION ACCESSORY? .....</b>	<b>34</b>
<b>SHOULD HIGH HEELS BE BANNED?.....</b>	<b>35</b>
<b>ARE HIGH HEELS AND OBSESSION? .....</b>	<b>35</b>
<i>Cannes Festival.....</i>	<i>36</i>
<b>EVIDENCE OF RISK.....</b>	<b>36</b>
<b>ARE THERE BENEFITS TO USING HIGH HEELS? .....</b>	<b>37</b>
<i>Drawing some conclusion .....</i>	<i>37</i>
<b>CAN WE LIVE WITHOUT TOES? .....</b>	<b>38</b>
<i>If a toe is amputated, will my balance be affected? .....</i>	<i>38</i>
<b>DO TOE EXERCISES PREVENT DEFORMITY OR HELP TOE DEFORMITY?.....</b>	<b>38</b>
<b>ARTHROPATHY - DAMAGE INSIDE THE FOOT!.....</b>	<b>39</b>
<b>HOW RELIABLE ARE X-RAYS FOR DETERMINING JOINT DAMAGE?.....</b>	<b>39</b>
<b>CARTILAGE DAMAGE IN HALLUX VALGUS.....</b>	<b>40</b>
<b>DOES CARTILAGE DAMAGE MAKE A DIFFERENCE TO TREATMENT?.....</b>	<b>41</b>
<b>IS IT TRUE SWEATY FEET ARE DUE TO POOR HYGIENE? .....</b>	<b>41</b>
<b>HOW MUCH DO FEET NORMALLY SWEAT? .....</b>	<b>42</b>
<b>MEDICAL REASONS FOR SWEATING .....</b>	<b>42</b>
<b>IRRITATING SKIN THAT IS NOT ATHLETE'S FOOT.....</b>	<b>43</b>
<b>DANCERS - GOING ON POINTE!.....</b>	<b>44</b>
<b>IS THE HEEL SPUR THE CAUSE OF HEEL PAIN? .....</b>	<b>45</b>
<b>DO CORN PLASTERS WORK?.....</b>	<b>46</b>
<b>ARE CORN AND CALLUS KNIVES DANGEROUS?.....</b>	<b>47</b>
<b>WHAT CAN YOU USE?.....</b>	<b>48</b>
<b>MYTHS ABOUT INGROWN TOE NAILS .....</b>	<b>48</b>
<b>CAN I CUT A 'V' IN THE NAIL TO HELP? .....</b>	<b>48</b>
<i>Naming the beast.....</i>	<i>49</i>
<b>INGROWN NAIL VARIATIONS.....</b>	<b>49</b>
<i>Shape.....</i>	<i>49</i>
<i>Break in skin.....</i>	<i>49</i>
<i>The Bridge.....</i>	<i>50</i>
<b>DO YOU HAVE TO SUFFER PAIN? .....</b>	<b>50</b>
<b>CAN ANTIBIOTICS TREAT THE INGROWN NAIL? .....</b>	<b>50</b>
<b>WHEN SHOULD ANTIBIOTICS BE USED? .....</b>	<b>50</b>
<b>WHO TO GO TO? .....</b>	<b>51</b>
<b>SHOULD WE PUT CHILBLAINS IN HOT WATER? .....</b>	<b>51</b>
<b>ARE AUTOCLAVES BETTER THAN ANTISEPTICS?.....</b>	<b>52</b>
<b>ABOUT THE AUTHOR .....</b>	<b>55</b>
<b>INDEX.....</b>	<b>56</b>
<b>BOOKS BY THE AUTHOR .....</b>	<b>58</b>

## A bit of overview



We all love stories, whether housewife tales or fables, like burying a piece of steak in the garden used to get rid of warts or preventing chilblains by keeping a horse's tooth in a pocket. Do eighty per cent of people have a foot complaint once in their life, or do we really walk 80,000 miles in a lifetime?

Well, what about walking around the world in a lifetime. True or false? If we walk 10,000 steps a day, and that can be a big ask for a westerner with a car, we walk around 3.31 miles per day. If we walk 80,000 miles, that comes to 1142 miles per year, and provided we live to three score and ten, this could mean walking around the globe, measured at the equator as 24,900 miles, completing two or more circuits.

The most common problems facing patients are ingrowing toe nails, corns, hammer toes, bunions, neuroma (Morton's) and swellings such as ganglia – plural of ganglion. These conditions, together with chilblains, nail fungi, heel bump pain and fasciitis (central heel pain), represent frequent complaints presented to the family doctor or podiatrist.

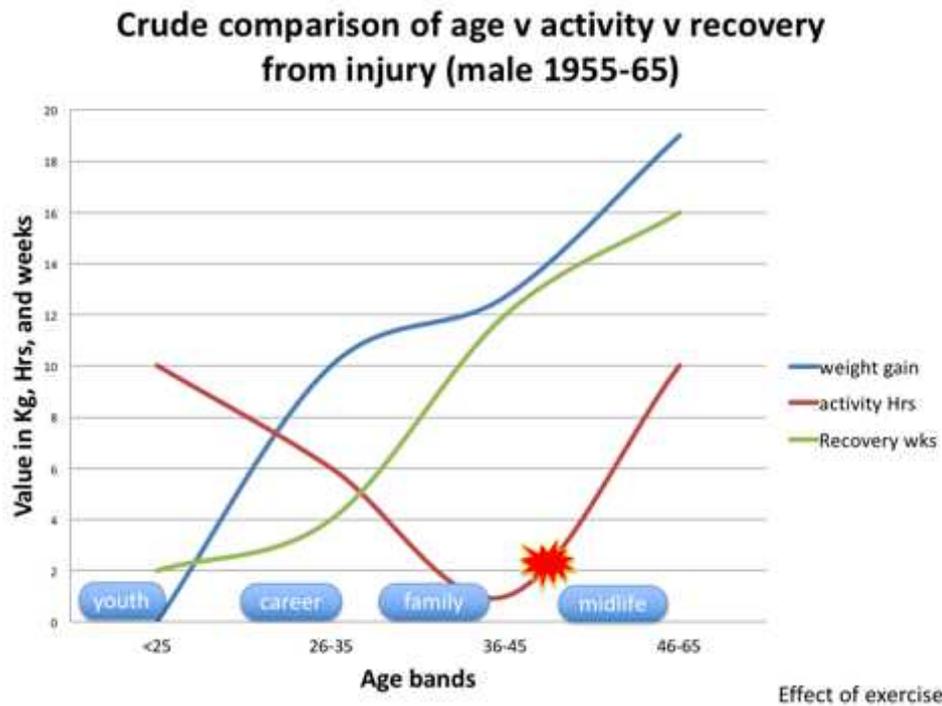
Patients in poor health are at most significant risk and no myths covering problems associated with nerve damage (neuropathy) and diabetes exist, which is for real. The reader is recommended to other sources related to the 'at risk foot' in mind.

## Damaging the body

With the upsurge of Musculoskeletal (MSK) Sciences, many professions hold a strong interest in biomechanics and find their skills overlap. Biomechanics is a word implying the science of movement and forces applied to living tissues. While skin stretches and can cope with the daily stresses of life in shoes and bare feet, cartilage deforms and restores its shape. Tendons stretch and contract aiding muscle action. Ligaments act like tent guides supporting the main canvas, which happens to be joints. Bone must deal with compression and bending forces. Each type of tissue mentioned copes with stress in some way to protect the body.

The promotion of fitness centres and our desire to lose weight has driven generations into fun runs. The message stay healthy is essential. However, people would do better if they walked and tailored exercise to their needs without subjecting their bodies to the madness of running, straining themselves in a fitness centre without due care to their previous injuries. It

is not just feet, but knees but all the structures of the musculoskeletal system – hips, pelvis and lower spine, that take the impact. Perhaps the message is not so much to keep running but use the expertise of professionals to design how we exercise based on the pre-existing condition of our bodies. A fifteen-minute assessment by a fitness instructor cannot, however well-intentioned, assess the human body with sufficient knowledge if previous weaknesses exist.



The graph is an interpretation of the timeline for age, weight gain, activity at work before retirement.

### Previous Injury

Injuries lie low for years; the visual graph expresses an assumed history based on my own experience. Weight gain hits us around the mid-thirties to fifties. While our physical activities may start at school age and then follow people into the next stage of their career and education, exercise often peaks when the career peaks. While only an approximate guide, our family and work change our attitudes until we don't feel so great about our body. Admittedly some people do have a vigorous exercise ethic throughout their lives. A good colleague was a triathlete and Iron Man competitor. He still died before he was sixty from cancer!

Recovery from injury is rapid when young but any traumatic effect lags behind, re-emerging later because of potential inactivity during mid-life. After retirement, and in some cases mid-life crises for both males and females, the impact of early injury becomes more relevant. The graph cannot apply as a generalisation; variables exist, but it illustrates how some injuries emerge later in life. The reason for making it explicit is exercise and activity is good for us all. It is good for our body by supporting functional strength and feeling at one in our mind. Stress diminishes and the boosted circulation helps our heart and brain. The corollary to this is that a wise man or woman knows when to stop if injured. Do you return to

the very activity you once loved only to injury yourself again? The problem is how much recovery can we achieve after injury. Talking feet and ankle, well, this may vary. The effect on joints and tissues may allow recovery provided that the diagnosis was correct in the first place.

Let's develop a scenario where you don't seek help, but your foot pain needs intervention years later. The treatment offered may work and allow you to continue your hobby or sport. On the other hand, treatment may be disappointing, and you believe the clinician you sought has failed. The variability in success following any medical management hinges on how much damage (pathology) was sustained not just at the first injury but subsequent injuries. I have called this the timeline, which implies an optimal point in an injury cycle when the trauma to the tissues mentioned above will recover. Athletes are professionals and loss of their ability means revenue cannot be recouped during their recovery period.

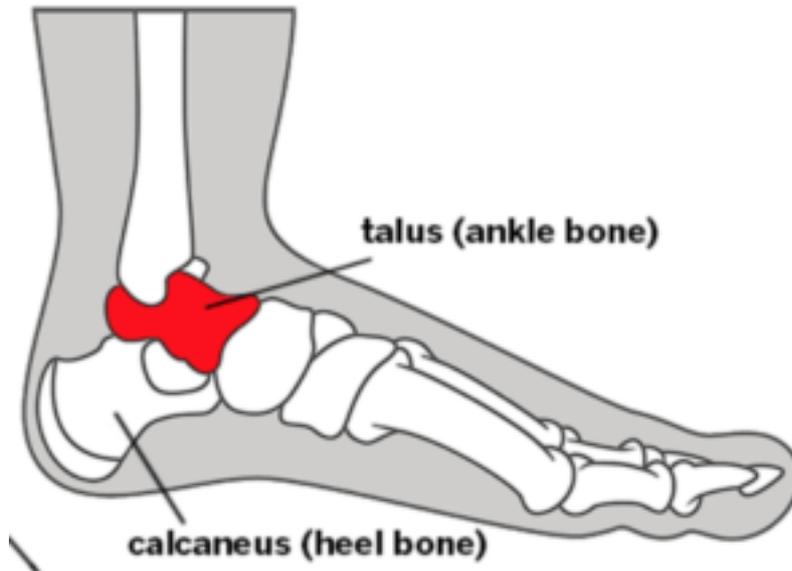
I interviewed Jenny, a former professional dancer. While Jenny never sustained a significant injury, it was clear she had experienced chronic problems over the years. Her following comment perhaps underlies the pressure that professional dancers have to endure.

*"I've probably had a lot of pain most of the time, and I think a lot of dancers do go through a lot of pain, but you just kind of get on with it. The worry of even mentioning it [pain] or anyone hearing about it because you don't want to tarnish yourself with an injury!"*

The Scottish tennis player Andy Murray was in so much pain that he required his hip joint to be 'resurfaced'. Such restoration of the joint surface helped him recover, but his performance would suffer as he hit his mid-thirties. Seasoned athletes can cope with damaged as they are psychologically programmed. Whereas you or I would stand down, they continue. As a result they will inevitably suffer from their injuries which once were acute and now will be chronic.

We all age at different rates, but as a statement, this is false because we all age. However, some look better than others at the same age. Pain ages us and affects us psychologically. It is worthy to note that we are not all designed to the same tolerances. Those who can cope best after injury do better if their mechanics are balanced to cope with the inevitable stress associated with exercise. Athletes perform at the top of their human ability. Build a bridge out of insubstantial materials and it will collapse prematurely. Use an engineering design that can cope with the stress of movement in all weathers, and that structure will hold up and last longer. In some ways this is true of our human make up, and the framework about which we exist is called the musculoskeletal system.

## Foot Bones

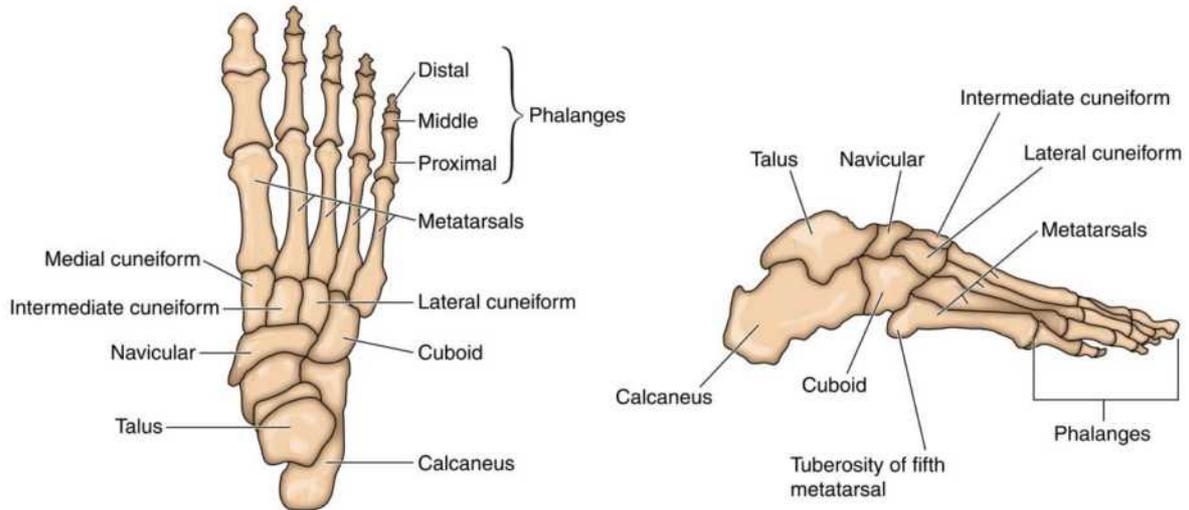


[https://www.hss.edu/condition-list\\_osteochondral-lesion-talus.asp](https://www.hss.edu/condition-list_osteochondral-lesion-talus.asp)

### The Talus

Maybe this is a little simplistic, but the foot moves on the bone called the TALUS. The name comes from the Latin word that related to dice used in a Roman craps game. The same bone from a horse functioned as the die called a talus. The basic shape of this bone is rectangular and has a curved top surface. The talus faces the toe end of the foot and has a defined connecting dome that sits in a concave-shaped bone called the navicular or 'boat shape'. It is the closest joint to the hip, except it does not have the same broad range of movement. Shapes of bones around joints are essential for stability.

Feet are designed to walk without pain and should function over variable terrain; the ankle's design breaks down into three joints around the talus. The talus forms the foot's steering wheel that uniquely connects the hindfoot to the midfoot. A good deal of pain, plantar fasciitis and metatarsalgia, the generic name for pain under the ball of the foot, arise where the talus does not function or more to the point the tendons stabilising the bone around its joint have weakened. The idea of the foot being flat emerges from problems around this bone and we will challenge the myths of flat foot later.



## How many bones are in a foot?

Patients often say *the foot is complex because there are so many bones*. The usual figure is 26 with 28 for the two sesamoids, but 25 can be possible as the fifth toe may only have two if they are fused as one.

### Accessory bones

Of course, there can be numerous accessory bones. These are add-ons but not counted as part of normal anatomy. Accessory bones are often silent and cause little trouble. However, and back to that exercise, some accessory bones do spark off complaints. So, where are these bones? The percentages vary between populations and race. Of the consistent additional bones, sesamoids, number two, so 26 or 28, is correct. The sesamoids of the first metatarsal are frequently overlooked when counting the bones. They are not accessory at all but part of a vital pulley system. Many of my patients looked at x-rays that I had taken and asked, "*what are those bones there. Are they normal?*"

### Sesamoid bones

The largest sesamoid in the body is the knee cap forming part of the knee's pulley system connecting the thigh muscle (quadriceps) to below the leg bone (tibia). The knee cap or patella enhances the efficiency of the knee. The first metatarsal sesamoids do the same thing. The big toe is stable against the ground because the sesamoid tightens the toe tendon at the right time. Pulleys work by using less effort for maximum gain and advantage. Remember your physics. You can lift the heaviest weight with little effort if you use a pulley system. Sesamoids are good bones and consistent, while accessory bones are much more easily injured and inconsistent.

The talus has an accessory bone behind the ankle called the Os Trigonum. The meaning of Os is bone, and trigone means triangular. Because the bone only exists in 7-14% of patients, it is different to the sesamoids, which are permanent features. The os trigonum is one

example of many accessory bones in the body. Injury traumatises these bones during some stressed activities such as dancing and football.

### **Is the sesamoid bone called 'Luz'?**<sup>1</sup>

After hearing that the sesamoid bone had a special spiritual name I decided to look further...

In rabbinic Judaism—the relevance to the evolution of the concept of death—was that of the "bone called Luz or Lus". Luz means Almond tree from the Hebrew and associated with a Canaanite city. The bone was related to everlasting life. The 'bone called Lus' was considered important and held in high esteem as a mystic in religion.

Rabbi Ushaia AD 210 describes the bone of Luz in his book Bereschit Rabbi or Glossa Magna In Pentateuchium, [great tongue of the five first books of the old testament –that there was a bone in the human body, just below the 18th vertebra that never dies. He suggested this bone was the repository of the soul after death; IT 'should never be burned or corrupted in all eternity for its substance is of celestial origin and watered with heavenly dew, wherewith God shall make the dead rise as with yeast in a mass of dough.' To add to the confusion, the bone of Luz might well have come from another part of the skeleton, such as the sacrum or coccyx, or elsewhere. The fable caught on, but the sesamoid was not a likely candidate.

The emperor Hadrian once asked Rabbi Joshua between the first and second centuries how God would resurrect people in the world to come. The Rabbi, a distinguished Rabbinic teacher, answered, "from the bone Luz in the spinal column."

He had then produced a specimen of such a bone, which could not be softened in water or destroyed by fire. When struck with a hammer, the bone had remained intact while the anvil upon which it lay shattered. Vesalius showed that the bone did not exist in 1543.

The sesamoid bones are as important as any of the bones associated with the great toe. The sesamoids are like the knee cap, a vital functional lever for the great toe tendons. The toe is maintained in a stable position during propulsion, being the last phase of stance. We will meet the sesamoid when discussing hallux valgus. *We all love a tale.*

---

<sup>1</sup> Lost Souls Helal, B The Great toe sesamoid bones: The Lus or Lost Souls of Ushaia. Clin. Orthopaedics & Related Research 1981 157;83-87



## **Is pedicure the same as chiropody?**

Pedicure and manicure are similar in that they offer a cosmetic service for nails on the feet and hands. Reducing hard skin may also be carried out. Formal chiropody no longer exists in the UK, extending to most countries where podiatrists manage the specialism of foot health. Training is different between the cosmetic side and the medical side of foot health management.

Being medically qualified implies becoming a doctor of medicine. Medically trained gives reference to a healthcare professional adopting medical methods based around formal medical practice within their area of specialty.

## **Where does the confusion lie?**

Unlike dentistry, the specialty of podiatry is less well known and morphed from chiropody around 1988 onwards. Dentistry can be traced back well before the 19<sup>th</sup> century, but until the early 20<sup>th</sup>-century, chiropody was poorly formed into a profession. We know that surgical chiropodists were recognised as far back as the mid-19<sup>th</sup> century because of various old publications. After the eighties, degree courses led to a Bachelor of Science in Podiatry (BSc). Podiatric medicine is now the formal subject; three years in England, Wales, Northern Ireland, and four years in Scotland. Those podiatrists who qualified before 1988, and did not have a BSc, often retained their original title of chiropody alongside ‘podiatrist’.

## **Is there an overlap between pedicure and podiatry?**

The only similarity between a cosmetic appointment and podiatry consultation is that skin and nail management is necessary to cut back nails and reduce bulky skin. The modern podiatrist is required to establish a cause of pain and changes within the skin. The bulk reduction is often due to abnormal pressure across the foot, infections and sometimes skin changes that require urgent management and diagnosis. Nails and skin are exposed to cancer, although rarer in the foot than elsewhere. If podiatrists do not reduce the bulk of the cellular build-up, then damage beneath the skin and nails made from keratin may deteriorate.

Podiatrists training involves recognising common medical diseases affecting the foot and the lower limb. They provide a range of treatment, diagnostic skills and medications that pedicurists don't offer within their scope.



## Who deals with feet in the UK?

Podiatry is the only profession dedicated to total foot care health and management. Foot care assistants work alongside podiatrists. Foot Health Practitioners are qualified but do not have a national register as podiatrists. The Health and Care Professions Council (HCPC) was established in 2003 and covers most non-medically qualified professions. Physiotherapists and occupational therapists might be involved with elements of foot care. Osteopaths and chiropractors also manage joints and muscles and could be involved with assisting foot pain. Acupuncturists are also qualified to deal with pain associated with the lower limb. Podiatrists overlap providing physiotherapy methods and in some, acupuncture and acupressure techniques as part of pain relief.

For more complex foot problems, patients can seek a podiatrist with extended training. These extended scope practitioners (ESPs) can help manage problems usually outside the care of the patient's general medical practitioner. Podiatric surgery came about from 1975 and now provides similar non-trauma surgery for a wide range of deformities at consultant level. Orthopaedic departments manage foot trauma within the NHS. Some orthopaedic surgeons overlap with podiatric surgeons for elective surgery. It takes around 16 years to become a medically qualified surgeon and 12-13 years to become a medically trained podiatric surgeon. Orthopaedics qualify as medical doctors first. Some surgeons specialise in vascular disease of the lower limb. While medical specialists cover rheumatology, cancer, skin diseases and endocrinology (hormones and metabolism), many clinical staff play a part in managing feet. The development of multi-disciplinary teams within both the independent and NHS sectors provide a wide range of care working together for the patient. The picture may appear confusing, but many consultations commence with the patient's general medical practitioner.



## What's a bunion? I thought only older people get these!

Bunion may have derived from French, so the story goes. The word '*oignon*' means bunion, while in East Anglia (England) '*bunny*' means lump. The bunion is the bump and associated with extra-bone (exostosis) on the one hand. On the other, it is associated with a sac of fluid – ganglion.

### How do we know if it is a bunion?

***There are three tests.*** Test 1 - place your finger over the lump and see if your finger causes an indent. In other words, is it soft and spongy? If yes, it is a ganglion. If not, it is an exostosis because a hard sensation suggests it is a bony bump under the skin (shown). This is test 2. You have to decide if it is a bunion or hallux valgus (bent big toe outwards). For test 3, place your hand over the bump so it is completely covered but leave the big toe end visible. If the big toe is straight and not pushing against the second toe, you have a bunion and not a hallux valgus. If the toe is bent and pushing the toe over, then you have a hallux valgus.



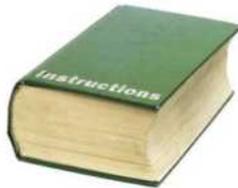
### *Does it matter if we call it bunion or hallux valgus?*

Bunions affect around 25% of the population, but this is a bit of an estimate. It is easier to call all toe problems with a large lump on the side of the big toe a bunion. In truth, you can experience bumps on top of the big toe joint. So sideways bunions are called medial and top side bunions, dorsal. Sideways bunions have more joint movement than topside bunions. The

latter has less movement related to the production of a bar of bone. Go to page 30 to see the range of hallux valgus deformities.

The extra bone (exostosis) is produced by the stretched ligament pulling on the bone causing new bone growth. The soft swelling is a thin sac of fluid, sometimes due to a bursa and sometimes a ganglion—damaged tissues associated with the joint lining change and organise the soft part of the joint creating fluid. The sac protects the joint on the one hand from further pressure until it becomes too large to fit into shoes. Technically the soft sacs associated with ganglia and bursae are different if we look under the microscope. Ganglia have thin membranes and bursae have thick fibrous capsular outer membranes. Under the microscope bursae are usually anatomically normal while ganglia are not. Hard bunion prominences cause more of a concern if the skin is broken, leaving an open wound. If you are not good at healing, an ulcer may form due to constant pressure.

Older people suffer from bunions more than younger people, but this is not the case with hallux valgus, and seen from teenage years.



## **Ganglia - Can a heavy book provide effective treatment?**

One of the most interesting myths through time is hitting a ganglion with a heavy book to reduce the problem. The Bible is one of the heaviest books in most households and was a popular source. In truth, this could be effective if additional trauma did not lead to fractures. Ganglia and bursae often appear together in conversation. They are different although present similarly as swellings. We have seen the ganglion related to a bunion, but the ganglion can locate over the midfoot and ankle.

The thin gossamer lining has a thick clear fluid-like gel. The lining is often hard to preserve during surgery. Fibrin and myxoid degeneration are present. Bursae are more chronic, and they have fibrous components within an organised cystic structure. It is possible to draw fluid off a ganglion, but it can be short-lived.

A heavy book will cause the outer membrane to burst. Reformation of any membrane can return if the derivative tissue remains as in joint linings or tendon sheaths. Ganglia can establish their structure within tendons<sup>2</sup>. A ganglion, when hit, can disperse, but the lining does not disappear and can regenerate within weeks.

Ankles, tops of feet, side and top joints of feet and even the toes have these swellings, although in the toes this is usually known as a mucoïd cyst. While harmless, all swellings should be checked and treated by a specialist rather than a GP in many cases. Ganglia descend deeper toward the joints and simple sucking off the fluid alone is pointless.

---

<sup>2</sup> Kono, M, Miyamoto, W, Imade, S, Uchio, Y 2009 Intratendinous ganglion in the extensor digitorum brevis tendon. J Orth Science Japan. 14:666-668



## Metatarsalgia

*Is Morton's neuroma more common in the 3-4<sup>th</sup> interspace or the 2-3<sup>rd</sup> interspace?*

There is an assumption that we know nerves can be damaged and cause foot pain and Morton's neuroma (M.N) is best known. First described by Lewis Durlacher<sup>3</sup> in 1845, Thomas G Morton reported this in 1876<sup>4</sup> and took the name. There is nothing like creating confusion Named characters have been added after operations and conditions often confuse the reader. Surgeons from the 19<sup>th</sup> century, in particular, labelled new medical conditions as did botanists label plants. Listerine was developed from Joseph Lister's work with carbolic acid as a phenol-based substance producing effective antiseptis. Most medical terms are in Latin, and some in Greek, affording medical knowledge almost as a religion.

Today all medical students learn a new language, one with mixed ancient words alongside their mother tongue. '...algia' is derived from the Greek algos meaning pain. Metatarsal is the long foot bone and one of five. Those sesamoids fit under the first metatarsal.

### Sex differentiation

If we accept some diseases are genetic, we see a unique set of rules. The haemophilia gene is carried by females but only affects men. However, when it comes to conditions like the bunion and Morton's neuroma, we say that it affects women more than men. *Why is this?*

This fact is true – the author can report 6:2 female : male (65 cases) which was similar from national data (4138 cases) where the incidence in gender is biased toward females<sup>5</sup>.

While footwear causes many neuroma problems, many complain of muscle spasm of the small foot muscles (interossei and lumbricals). Most conditions in the foot affect both gender

---

<sup>3</sup> Durlacher, L 1945 A treatise on corns, bunions, the diseases of nails and the general management of feet. Simpkin, Marshall and Co, London

<sup>4</sup> Morton T 1976 A peculiar and painful affection of the fourth metatarso-phalangeal articulation. Amer. J. Med. Sci 71:37-45 <http://dx.doi.org/10.1097/00000441-18760100-0002>

<sup>5</sup> Tollafeld D R 2016 National Database Survey Neuroma Surgery. [WWW.PASCOM-10](http://WWW.PASCOM-10)

groups. They are not equal because of exciting factors such as footwear. I will get onto high heels a little later on.

### **Who's name was it really?**

Thomas G Morton described the 3-4<sup>th</sup> interspace as the location for the neuroma and the 2-3<sup>rd</sup> interspace. Lewis Durlacher, a 19th-century British surgeon-chiropractor, wrote about this phenomenon in 1845. In his account the problem affected the 2-3<sup>rd</sup> interspace. His publication arose before Morton had written up his account in 1876.<sup>6</sup> When naming conditions it is easy to lose the origins of who first wrote an account of metatarsalgia. Sometimes reports of medical conditions can be described at similar periods in history by different authors. After that the original version might be argued later because communication methods did not have the benefit of the internet.

Nerve pain can be difficult to locate, but with the condition of Morton's neuroma, the problem is even more confusing as it can mimic other metatarsalgic conditions. Of the most easily missed are joint inflammation (synovitis) and a torn ligament around the under surface of the toe (metatarso-phalangeal) joint. Other conditions exist but there is no reason to confuse further.

### **So where does the neuroma lie?**

Evidence suggests 2-3<sup>rd</sup> space had 9 cases versus 8 cases for the 3-4 web space in a study of 17<sup>7</sup>. However as we all know you need larger study numbers and the truth is that there is a wide variation from many papers. In general we might expect the incidence to favour the 3-4<sup>th</sup> web space as shown from a study of where 19 lesions were located in the 3-4<sup>th</sup> web space and 12 in the 2-3<sup>rd</sup> web space<sup>8</sup>. We of course come back to the confusion as what is it called and Morton's predominates for both web spaces. As with all good research we need a third viewpoint and this comes from a clinical study of 54 feet where 2-3<sup>rd</sup> webspace showed as 20 feet and 3-4<sup>th</sup> webspace as 18 feet<sup>9</sup>.

### **Does it matter how we record data?**

The reader should always be aware that many papers report people as in patient numbers and then may also report feet. Additionally papers also record lesions. In the first case people, the second, lesions (nerves) and lastly, feet. If we compare each we are going to be in error. Seventeen people implies 34 feet, which potentially means 68 potential 2-3 and 3-4 web spaces. When trying to assimilate facts we must compare apples with apples and not apples with pears!

---

<sup>6</sup> Durlacher, L. *A Treatise on Corns, Bunions, the Diseases of Nails and the General Management of the Feet*. 1845. Lea & Blanchard [now available on Kindle].

<sup>7</sup> Tollafield D R 2016 Clinical Histology Audit of 17 cases of plantar neuroma at one centre (unpublished)

<sup>8</sup> Bencardino, J, Rosenberg, ZS, Beltran, J, Liu, X, Marty-Delfaut, E Morton's Neuroma: Is it always symptomatic? *Am. J. Radiology*:175. 2000;649-653

<sup>9</sup> Mahedevan, D, Venkatesan, M, Bhatt, R. Diagnostic accuracy of clinical tests for Morton's Neuroma compared with ultrasonography. *J. Foot & Ankle Surg.* 2015;54:549-553

### **Is there a true neuroma in the 2-3<sup>rd</sup> toe space?**

Perhaps we are being picky here but it is true that some neuroma symptoms are attributed to a bursa. This is a condition often where anatomy forms a sac to protect two surfaces. These are anatomical bursae as opposed to those we will see later called adventitious bursae. In other words they develop because of abnormal pressures. The only way to find out what is in the spaces is to operate and remove the specimen. To do this we send the sample to histology.

#### *Histology*

Histology reported no evidence of a bursa in the sample from my centre<sup>7</sup>. However, a bursa can arise between the 2/3<sup>rd</sup> space. Dual interspace neuromata can arise and are recorded 1 out of 19 (5.2%) from randomised histology samples. Modern methods for identifying the presence and size of nerve swellings are favoured by using ultrasound to confirm the diagnosis. We can audit the comparisons between ultrasound and histology to check out the accuracy of our diagnosis. However given the scientific name ‘specificity’ we know that symptoms between bursa and neuroma cause confusion. Sixteen cases were reviewed; 25% were reported as bursa formation by ultrasound, where histology contradicted this finding<sup>7</sup>. The accuracy of ultrasound must be called into question when making a definitive diagnosis. Put another way, we need two methods of testing to validate our clinical diagnosis.



### **Could Foot Shape Cause Morton's neuroma?**

Perhaps my obsession with Morton's neuroma was because I actually had one and required treatment. This puts me at an advantage as a patient and a clinician. You can read more about my neuroma in my book *Podiatrist Turned Patient*<sup>10</sup>

---

<sup>10</sup> Tollafield, DR, Morton's Neuroma. Podiatrist Turned Patient: My own journey. Busypencilcase Communications 2018. Amazon books. E-book & paperback

## Ancient Statues

Statues from the ancient world can reflect the different shapes of feet. There is nothing more curious than the recreation of toe length. The Egyptians suggest a second toe similar in length to the first, while the Greek foot represents their populace with a long second toe. *Could toe length influence the occurrence of a neuroma?*

Dudley Morton, in 1927 was interested in the genealogy of the first toe and considered the Greek foot predominated Morton's neuroma. Jump repeated the study with 184 patients in a retrospective study and formed two cohorts for the study. In 133 cases taken from his cohort A, patients were selected as a control. Twenty per cent (20%) had Greek foot and were asymptomatic.

When considering cohort B, of the group with foot pain and suspected neuroma, 63% had symptomatic Greek feet, and 37% had Egyptian feet.

While the association suggests a greater likelihood even with attractive statistical significance ( $p < 0.05$ ) there is no conclusive proof. We can therefore see a divergent discrepancy with statistics and factual evidence forming any sense of predictability.

To test the theory of metatarsal length against the incidence of a neuroma, histology reports were reviewed (by this author) and compared to available x-rays. Two radiographers looked at the x-rays. Results showed that most presented with the Greek foot style and associated with neuroma (mean 68.6%). The smaller sample agreed with Jump.

Neuroma of the metatarsals creates a wide range of symptoms that can radiate into the hindfoot. Sensations can be painful, affect normal walking, produce shooting, burning and numb type pain.

Much discussion has been written here about the facts and myths surrounding a nerve swelling called Morton's neuroma. In practice this is called as named but in fact the pure terminology assigns this condition as plantar digital neuritis. Neuroma is not a tumour neither does it show a tendency to become malignant. Mind you in medicine we should never say never! And so to conclude what about treatment, and should you have surgery? We end with Bennett's study from 1995.

## Can foot orthoses help neuroma?

Is it a myth or fact that the type of neuroma attributed to Morton or Durlacher can be improved with conservative treatment?

Bennett studied 115 patients where 49.5% benefitted from orthotic or footwear advice<sup>11</sup>. Only 16% ended up with surgery. In my case, orthoses kept me comfortable for over 5 years before discovering that I had made the problem worse with cycle shoes.

The conclusion must be that surgery is a last resort. There should always be time for conservative management for the plantar digital neuritis, as Morton's neuroma should probably be known.

---

<sup>11</sup> Bennett, GL, Graham, CE, Mauldin DM. Morton's interdigital neuroma: a comprehensive treatment protocol. *Foot & Ankle International*. 1995;16:760-3



## The arch & the army

Is it better to have a high or low arch foot? We all know the answer – I hope? The low arch foot because the low arch foot has more flexibility.

One of the first ways to manage a flat foot was considered stimulation of the small muscles. Scientists from the eighteenth century had pioneered the advent of electricity used in animals, such as Galvani in Italy (1791). The use of electricity to stimulate muscles became a significant development in medicine, not just for feet. The foot's small muscles cannot respond to any significant stimulus, and certainly not for the long arch. These muscles are 'worm-like' as one group is known - lumbricals (lumbricales). The other set of muscles, known as interossei, lie between the metatarsals. The external posterior and anterior leg muscles do assist the arch shape.

### An obsession with arches

The obsession with arches has led to a mega-industry for many different professionals and commercial outlets issuing insoles and arch supports. *So do they do any good?*

During the first part of the 20<sup>th</sup> century in Britain, a flat foot excluded any foot soldier from the army, making a travesty decision. Many athletes perform well with flat feet and yet a large industry of speculators make spurious claims. Is this a good sales pitch? It was not until Harris and Beath (1947) set up a large study looking at 3619 Canadian soldier's feet that more information was forthcoming. They developed an ink mat to study pressure and arches, forming an arch index measurement, which contributed to some of the x-ray shots of the hindfoot -subtalar joint.

---

*"It is a useless waste of time, effort and money to enlist men whose feet will not permit them to undertake the duties of a soldier even though they may have succeeded in finding themselves a niche in civil life in which they can compete on equal terms with their fellows."*

---

This authoritative quotation comes from the classic and oft-quoted Army Foot Survey<sup>12</sup>

---

<sup>12</sup> Harris, Beath 1947 An Investigation of Foot Ailments in Canadian Soldiers, published in 1947

---

*"It is evident that we cannot be content merely to recognise the deformity of flat foot. Our concern is with function. If this is good it matters little whether the longitudinal arch is depressed"*

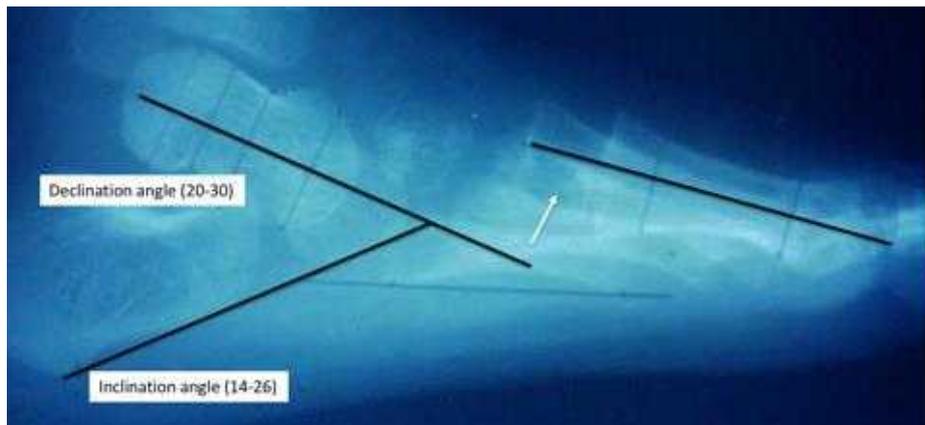
---

An army depended on the foot soldier when lack of transport ran and forced them to rely on their feet. The army doctor focused on the arch for this reason. Stories like

– *"the hunter who tramped 200 miles out of the bush in order that he might reach Edmonton to enlist, and then tramped back again the 200 miles to his trapping ground after he had been rejected because of his flat feet,"* made the exclusion somewhat fallacious.<sup>13</sup>

Fellner<sup>14</sup> used e-talk to discuss the flat foot and Harris and Beath's work. He stated that,

*"The flexible, or hypermobile, flatfoot accounted for most of the flatfeet that they identified in their study population. This type was determined to be the normal contour of a strong and stable foot, and not the cause of pain and disability. No one before nor since then has provided scientific evidence to refute their claim, yet the controversy continues."*



The foot is designed to cope with terrain variation and conceived as three arches; the long medial arch, the mid transverse arch and the lateral arch.

Morton Altman (1968)<sup>15</sup> reviewed lateral weight-bearing x-rays in 138 subjects between 1-18 years and plotted the sagittal plane position (shown). He noted that the talus and calcaneus varied in pitch (angle to the ground), increasing as the child developed. The pitch of the calcaneus varies from 1 year between 10-27 degrees, and at the age of 6, it reaches 14-26 degrees. The talus decreases with age, so at 1 year, it angles around 23-40 degrees, and by six reduces down to 20-30 degrees.

Altman's study was large and unfettered by strict ethical committee approval, as no doubt radiation was used without therapeutic intention. The importance of the work cannot be underestimated and shows that the foot changes from birth and wide variation arise so that no-one standard arch position exists.

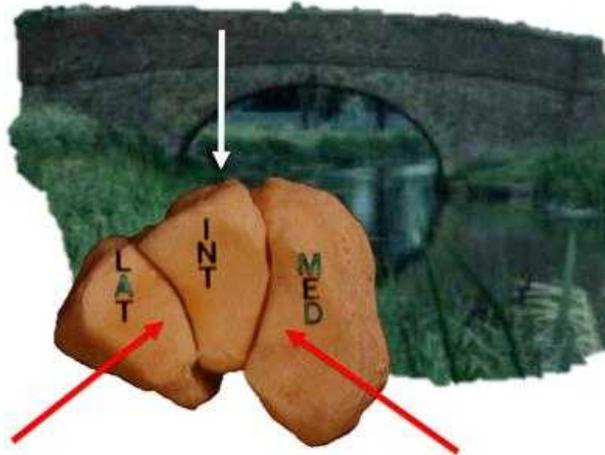
---

<sup>13</sup> Seiden, H 1992 Flat feet don't automatically mean bad feet. The Gazette (Montreal) 17 Oct 1992: J6.

<sup>14</sup> Fellner D, 2012 E-talk Flat feet, kids, the military and orthopedists – what the literature tells us

<sup>15</sup> Altman, M 1968 sagittal Plane angles of the Talus and Calcaneus in the Developing Foot. JAMA 58; 11:463-470

The report did not show the variation between measurements; today, expressions such as standard deviation would be represented on a graph. Attempting to identify single values as applied to the pitch of the calcaneus and talus is erroneous. Humans have no fixed design, and biostatistics exist that do not have ranges according to male, female. In the case of diversity of races, there are differences depending upon the person's origin.



### **Transverse arch**

The transverse arch is made from the midfoot bones, the three cuneiforms (shown) and cuboid. These neatly fit the concept of the humpback bridge in cross section. Their small facet like joints allow for minimal movement while removing the tendons would still maintain a theoretical arch. This fact provides only a weak theory. If the large tibialis posterior tendon is cut, as occurred in a young patient reported by Citron (1985), the whole foot collapsed on the inner side. However, in dynamic terms, the bones act like cuboid bricks. Upward forces push the bricks together with an increased load (body weight on the ground). Bones become more stable as the base of a bridge associated with equal forces. Downward force and upward reaction force create stability (see arrows).

### **Flexible foot**

Of course, some feet look very flat. The foot's shape is often flat in black Caribbean feet because the heel bone (calcaneus) has a lower pitch than the feet of a white person. Such a finding should not cause alarm, much as Fellner says. The Africoid association with the flat foot does not deter the individual from athletics as we know from success in the Olympics. However, if one believes a flat foot is a bad acquisition, then read on.

### *Shape changer*

McPoil (2009) showed that the longitudinal arch drops on weight-bearing by 14 degrees, and Nilsson (2012) by 13mm<sup>16</sup>. The length changes, as does the width with complete contact and provides shock absorption. Shock absorption comes from the talo-navicular joint, created by movement on contact. The fascial band further assists by bracing between the heel and toes.

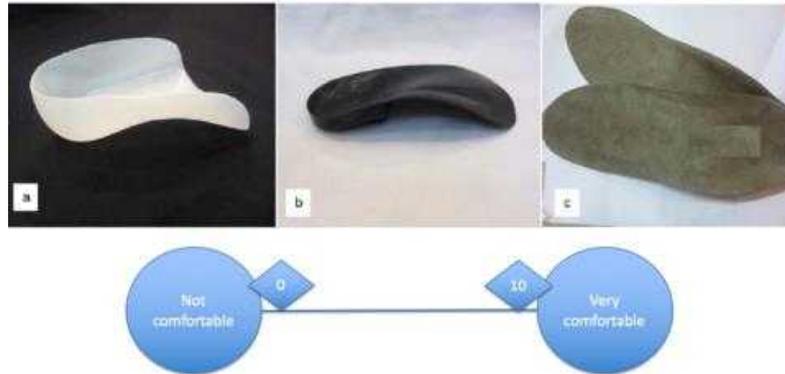
---

<sup>16</sup> Shekyhi-Dolagh 2015 (International prosthetics and orthotics international Vol 39(3): 190-96

The foot drops down, then comes back up bobbing like an angler's float on water as we move forward to toe-off.

During everyday active life, there is no reason why the flexible flat foot cannot cope. Suppose undue stress arises, the tissues cannot cope when exposed to larger forces. In that case, symptoms are inevitable and give rise to fasciitis and posterior and anterior tibial tendon strain (shin splints). Orthoses play a significant part in helping patients with these forms of tendon strain.

"Flexible flat foot arises with reduction of the medial long arch... a foot orthosis is thought to modify and control excessive pronotation and the arch height index<sup>17</sup>."



<sup>17</sup>Shekhyi-Dolagh et al The influence of foot orthoses on foot mobility magnitude and arch height index in adults with flexible flat feet. ( International prosthetics and orthotics international 2015 Vol 39(3) 190-96)

## Do we need to 'jack up the arch'?

A flat foot will not necessarily tolerate a high arch established in a recent study by Sheykhi-Dolah (2015).

### Orthoses and the arch

What type of orthosis to use comes down to what a patient can tolerate. Females are troubled by the limitations of designs compared to males implying that a gender variation exists.

Twenty people with flat feet aged 20-26 were selected in a study. Three types of orthosis were selected; rigid (UCBL<sup>17</sup>), semi-rigid in prefabricated formed plastic and softer polyurethane orthosis (PU). The functional orthotic (b) was tolerated best.

Foot mobility magnitude was expressed as the square root of the difference between the (arch height index)<sup>2</sup> and the difference in the (forefoot width)<sup>2</sup>, which provide overall changes seen in the height of arch, length and width of the foot. Comfort was measured on a 1-10 scale, where ten was most comfortable. The UCBL scored three, and the semi-rigid orthosis scored 8.

The softer PU orthosis scored 6. The critical point is that some control is better than no control, and soft materials do not make the best orthosis just because they are soft. Hard, rigid

<sup>17</sup> U.C.B.L stands for University California Biomechanics Lab. The design is a high rearfoot component and the arch usually raised high on the medial and lateral side affording almost rigid control.

orthoses may control the foot as the arch indices changed less in the research but were poorly tolerated.

### **Anterior (transverse) arch**

It is essential to say something about the dropped ‘anterior’ arch. Much has been made of the anterior arch, although there is no such thing. The three middle metatarsals work independently to the lateral first and fifth metatarsals. The latter metatarsal can rise up, exposing the central three metatarsals; they are referred to as rays and change position when dorsiflexed or plantarflexed. A fixed position is easy to spot. An x-ray shows the heads are relatively even. Soft tissue provides the impression that a metatarsal head has dropped.

The shape is difficult to capture by x-ray, although computerised tomography provides greater visual accuracy. Radiographic studies from 100 feet, 59 with hallux valgus, were compared to a controlled group.<sup>18</sup> While the load may be maintained under the second metatarsal, the heads of the central metatarsals showed little difference when compared.



### **Footwear clues**

When it comes to treating flat feet, it is crucial to differentiate ‘flexible’ from ‘fixed’. The patient in constant pain needs investigating before using orthoses. Footwear should be evaluated and replaced. The shoe illustrated required replacement every six weeks. All tread on the medial (inner) side showed wear. Frequent replacement with cheap shoes meant the shoe's life span of the case illustrated was short and set up a cycle of continued shoe wear.

One must bear in mind that while medial wear is associated with flat feet, high arch feet can also increase medial wear. The inverted heel shifts medially, breaking down the inside

---

<sup>18</sup> Suzuki, J, Tanaka, Y, Takaoka, T, Kadano, K, Takaura, Y 2004 Axial radiographic evaluation in hallux valgus: evaluation of the transverse arch in the forefoot. *J.Orthop Sci.* 9:446-451

heel counter (back) of the shoe. It is a myth that only flat feet will cause inside wear on the heel.

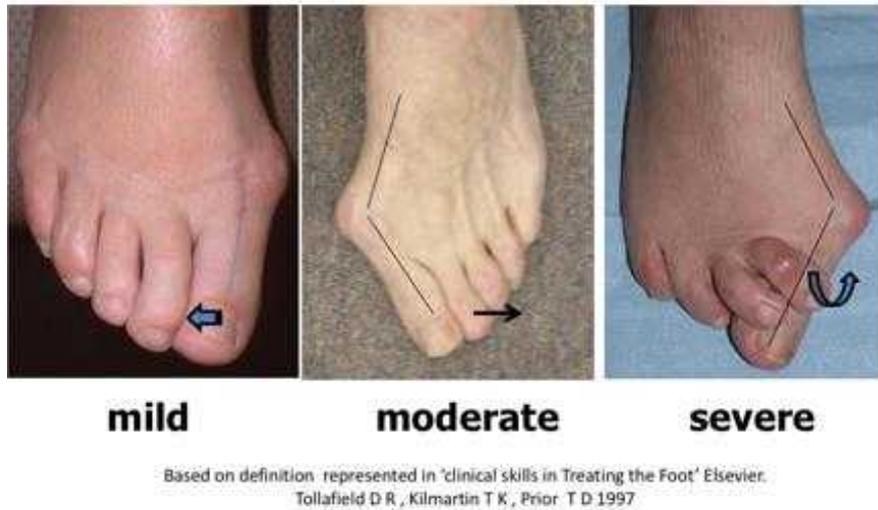


### **Can podiatrists help the police solve crime?**

Conviction of criminals of course depends on evidence. We have all heard about CSI (USA) and SOCO (UK)– Crime scene investigator and Scene of Crime Officer. While the police will use their regular laboratories podiatrists have been assisting police with patterns of walking and certain shoes types and footprints. Popularised by one police fiction writer, Peter James uses podiatrist Haydn Kelly in his Brighton based crime series.

There is no established formal qualification for podiatrists at this time but experience is essential with credibility in the field of gait analysis. The sub-group specialising in helping the police are called forensic podiatrists.

## Staging by clinical observation



## Bunion versus hallux valgus? Conflicting opinions!

One of the most frequent complaints that can come into the podiatrist's office is the bunion. We have three myths to solve.

- Provide evidence that bunions are not caused by footwear.
- Secondly to suggest you can use toe splints to straighten bunions.
- Decide if bunions are hereditary.

The most revealing picture in a podiatry textbook was a proud male African native standing for a photo (Root, Weed & Orien, 1977). The tribesman had never worn shoes and yet he had a sizeable bunion. Poor footwear can aggravate a deformity to reveal problems across the whole forefoot. The deformity was considerable and the forefoot is wide. Shoes do not cause the bunion alone. The skin becomes irritated over the bump causing localised damage.

### Evidence to rebut footwear as a cause of bunions

Few studies examine multiple risk factors for hallux valgus although Nguyen (2010) considered a study involving a sample of community-dwelling older women and men in the USA<sup>19</sup>. One of the conclusions from the survey reflected the biological, structural and behavioural differences in men and women. We respond differently in our cellular bodies and act out in life, both in dress code and attitude to intersocial relationships. Nguyen considered that sex imposed different factors, borne out by twice the number of females to men that

---

<sup>19</sup> Nguyen, US, Hillstrom, HJ, Li, W, Dufour, AB, Kiel, DP, Procter-Gray, E, Gagnon, MM, Hannan, MT. Factors associated with hallux valgus in a population-based study of older women and men: the MOBILIZE Boston Study. *Osteoarthritis*. 2010; 18 (1): 41–46.

suffer. The role of body weight and height relationship (body mass index, BMI), high-heeled shoes and flat feet are all associated with foot pain in the presence of HV.



A Japanese study (Kato 1981) considered that once the population had moved away from traditional shoe styles, involving Geta socks and Tabi sandals, in favour of western-style shoes, orthopaedic surgeons identified an increased incidence of operations.<sup>20</sup>

### **Is there evidence to suggest footwear doesn't cause bunions?**

**Abbas Rahimi *et al.*** (2012) provides another perspective, '*(The) incidence of HV deformity in Iranian university students, as a sample of Iranian youngsters, is much higher than those in some Western societies. This deformity showed to be highly inherent due to the increasing level of this deformity among first-degree relatives. Routine use of high heel or round tip shoes showed no influence on the rate of HV deformity.*'<sup>21</sup>

**Davenport *et al.*** (2014) add to the argument that HV does not come down to one factor alone. '*Risk factors for hallux valgus... may include increasing age, female gender, genetic predisposition, constrictive shoe wear, first ray hypermobility, foot architecture, tight Achilles' tendon, and first metatarsal length.*'<sup>22</sup>

So, is it a myth that shoes cause bunions, given evidence from the findings of the Kato study. To understand a problem and use our scientific knowledge we have to consider more than one reading source.

---

<sup>20</sup> Kato, T, Watanabe, S. The etiology of hallux valgus in Japan. *Clinical Orthopaedics and Related Research*. 1981; 157: 78–81.

<sup>21</sup> Abbas Rahimi, A, Rezaee, M, Behrouzi, R, Naemi, S. Incidence of hallux valgus deformity among Iranian university students. *Tibb-i Tavānbakhshī*. 2012; 1 (2): 45–52.

<sup>22</sup> Davenport, KL, Simmel, L, Kadel, N. Hallux valgus in dancers. *Journal of Dance Medicine & Science*. 2014; 18 (2): 86–92.



## Toe splints and separators for hallux valgus

Many believe if you push the toe over and hold it away from the second toe, the deformity can be corrected. This is a total myth. Splints do not work anymore than King Canute attempting to push the tide back. The King was trying to make a point (c.1030 AD). The myth was recorded with the apocryphal story when Canute said, *"Let all men know how empty and worthless is the power of kings, for there is none worthy of the name, but He whom heaven, earth, and sea obey by eternal laws."*

Several studies, including Tehraninasr (2008), have been undertaken. Pain improved for a short period of weeks, but the deformity did not change.<sup>23</sup> More recently, Karabicak 2015<sup>24</sup> and Plaass 2019<sup>25</sup> come to the same conclusion. Toe splints have no adequate corrective power. Overcoming the deforming forces of dislocation of the first toe joint and contractures, let alone changing bone, is impossible. The next topic covers ‘**heredity**’.

---

<sup>23</sup> Tehraninasr, A, Saeedi, H, Forogh, B, Bahramizadeh, M, Keyhani, M. Effects of insole with toe-separator and night splint on patients with painful hallux valgus: a comparative study. *Prosthetics and Orthotics International*. 2008; 32 (1): 79–83.

<sup>24</sup> Karabicak, GO, Bek, N, Tifticki, U. Short-term effects of kinesiotope on pain and joint alignment in conservative treatment of hallux valgus. *J. Manip.Phys. Ther.* 2015;38(8): 564-571

<sup>25</sup> Plaass, C, Karch,A, Koch, A, Wiederhoeft, V, Ettinger, S, Claasen, L, Daniilidis, K, Yao, D, Stukenborg-Colsman, C Short term results of dynamic splinting for hallux valgus — A prospective randomized study. *Foot & Ankle Surgery*. 2019 <https://doi.org/10.1016/j.fas.2019.01.002>



### **If your parents had a bunion, will you get one?**

Without delving into Mendel's theories of genetic dominance we can apply some practical observations. Two matters jump out at us. Females suffer more from hallux valgus than males. The bunion can arise on the side or top of the big toe joint. Men certainly have bunions and because they cope better in typical male footwear. As I discussed earlier, my grandfather's foot distorted the shoe comfortably! My mother had hallux valgus, as did her younger sister. Their mother died when I was ten so I do not know if she had a hallux valgus.

I have seen mothers and daughters with hallux valgus and this can affect one or both feet. However, the gene also misses a generation, so the grandmother can present with the problem and then the granddaughter.

Take the population of any country and females will dominate the bunion problem but also suffer more. If a parent has a deformity, then there is a reasonable chance you will have the condition. The only concern is how far will the problem progress?

**Piqué-Vidal** (2007) reviewed 350 subjects across three generations. The ratio of women to men with bunions was nearly 15:1 and provided a genetic line of argument as a 56% likelihood.<sup>26</sup> The female sex predominated with regard to the gender of parents with *hallux valgus* ... (the) severity of *hallux valgus* was not significantly influenced by gender, the affected branch of the family, or gender of the affected relatives. Family history of bunion deformity was present in 90% ... affecting some family members across three generations, which is compatible with autosomal dominant inheritance with incomplete penetrance.

---

<sup>26</sup> Piqué-Vidal, C, Solé, MT, Antich, J. Hallux valgus inheritance: pedigree research in 350 patients with bunion deformity. *Journal of Foot & Ankle Surgery*. 2007; 46 (3): 149–154.



### **How bad can a bunion (hallux valgus) get?**

The picture shows that the first toe can continue drifting with age, but, although very rare, it is possible to be born with hallux valgus, a little known fact. The bunion is the enlarged area attributed to bone outgrowth (exostosis). Hallux valgus is a positional dislocation.

Of course, the word bunion is misconceived and, in layman's terms, has various connotations. The reasons given for seeking help include,

*"Should I wait until it hurts?" "... don't like the look of it!" "Want to stop it getting like my mother's" "Can't get shoes on I want".*

The family doctor often sees a bunion differently, not being ripe enough for surgery! The bunion causes wide feet and alters the action of tendons, so hammer toes and dislocations misalign the forefoot. Grandparents who do nothing may appear to have awful feet. My grandfather's shoes had a prominent bump, but the foot didn't hurt. His shoes were spacious.

Tight shoes will rub over fixed deformities, and pain adds to the discomfort. There is a litany of problems from corns to chilblains, ulcers to infections in the joint.

Hallux valgus is more of a lady's problem than a man's problem



## Footwear and Martyrdom with feet

The footballer David Beckham and his pop singer wife Victoria are brand names<sup>27</sup>. He inadvertently promoted the Aircast™ boot after experiencing a second metatarsal fracture while a tabloid newspaper photographed his wife with her bunions and shoes.

Many shoes derive from the past for different purposes. Fashions often take off from courtesans, but today pop stars and sports idols can make a difference to fashion trends. Mrs B's foot shape does not look too bad. Shoes have been regarded as the instigator of many problems. This is true but we need a bit of sympathy because those with deformity are disadvantaged. Unless a shoe can be handmade to fit (bespoke) then problems often arise due to pressure.

### Wide shoes

The front shape of shoes are curious. The wider shoe shape probably is attributed to Henry VIII (1492-1547), the much revered and hated anti-papal English King, wore wide shoes because of gout. Gout is an inflammatory condition of joints caused by abnormal production of sodium urate associated with faulty enzymes. Purines of which rich foods were the culprit truly brought this on. Given the high meat diet of Henry, added to his weight gain and purulent legs in later life, one is not surprised he had foot problems. Once the width of shoes impeded normal mobility the trend eased back.

### Narrow-pointed shoes

Shoes in medieval times were part of a status symbol. The medieval knight not only adopted long armoured shoes, but these were pointed. Long shoes were considered sinful and should

---

<sup>27</sup> Sara Nathan 2009 Victoria Beckham shows off her pedicure (and bunion) as she loses a shoe 11 December 2009 <http://www.dailymail.co.uk/tvshowbiz/article-1234900/Victoria-Beckham-shows-pedicure-bunion-loses-shoe.html#ixzz4HFlyi390>

only be worn by soldiers, according to a preacher Giovanni de Capestrano (1386-1456). This did not stop the fashion from spreading all over Europe<sup>28</sup>.

During the period 1300-1500 the footwear style known as *Poulaines* became popular. While the origins seem to have emanated from Poland and named by the French. Possibly named from the ship's figurehead – polena, the shoe is reminiscent of those found in Middle Eastern footwear.



### **The myth from the grave**

Following an excavation of bodies from sites around Ipswich, England, Mays (2005) produced a report tying footwear to the prevalence of hallux valgus. Working from limited material which often only allowed visual appearances of the main first metatarsal deductions were made about footwear and the deceased inhabitants. He concluded that the well to do who were buried in parish grounds because of their wealth had a higher incidence of the deformity. This was based around the altered shape of the head of bone. Poulaines, the pike or spike type shoes the cause. I approached Dr Ana Deissler who researches medieval footwear and makes shoes today for sale. She advised that there would be no way that Poulaines could cause hallux valgus as the leather is soft.

The myth from the grave seems false despite the facts presented based on two grave sites; one with well-to-do people, the other site set away from consecrated ground. While this appeared an attractive answer it was flawed. Shoes do not cause deformity except in unusual circumstances. Restricting growth however will cause deformity. Even the Chinese bound foot was assisted with division of soft tissue in the arch of the foot to make the length shorter. Binding is now an outlawed practice.

### **Are high heeled shoes a new fashion accessory?**

The Middle East was favoured as the source of the higher heel shoe as with other patterns of design. High heels in Europe made their debut in the upper 16<sup>th</sup> century. Louise XIV gives way to the fashion exceeding to the courtesans and male. The shift in gender emerged as an exclusive feminine item by the early 18<sup>th</sup> century. Mary Wollstonecraft may have been one of the earliest critics that women used fashion to exploit their position and influence men in her book *A Vindication of the Rights of Women* (1792)<sup>29</sup>.

---

<sup>28</sup> Muzzarelli, MG In *Shoes. A History from Sandals to Sneakers*, ch.2 Sumptuous shoes. Ed. Blahnik, M. Published by Berg 2006:67-71

<sup>29</sup> Semmelhack, E In *Shoes. A History from Sandals to Sneakers*, ch.11 A Delicate Balance. Women, Power and High heels. Ed. Blahnik, M. Published by Berg 2006:225-230

In this next section the myth about women continues and sources from modern newspapers helps to consider a new argument.



## Should High Heels be Banned?

The patient pulled out her new shoe with pride (illustrated) and asked me what I thought? Her trainer can be seen on the other side of her left foot. The 42-year old had a significant hallux valgus on both feet and a bump over the midfoot. Should the high heel be the bane of every podiatrist's life? There are two views. The arch is elevated and can relieve some of the pain brought about by ankle tendon (tibialis posterior) overuse. The foot is often fully tilted (supinated), which does not need extra tendon pull.

The heel cord tightens with excessive use and of course, lower shoe heights may not be as comfortable—the increased forces acting on the forefoot exciting conditions like Morton's neuroma. A nipped off nerve between the 3-4<sup>th</sup> toes may be created and then scar. The ball of the foot is exposed to shear and friction forces. Small siliconised pads are used in shoes to reduce some of the pressure. Risks of injuries to the ankle and higher up the frame can arise. Being prejudiced, I looked for more information as to why women wear high heel shoes.

### Are high heels and obsession?

In the USA, one survey identified the fact that 62 per cent of American women wore shoes with a 2-inch or greater heel regularly, Bob Shepard, 2015. Stories from newspaper reports - UK to Australia, India to Alabama, are included. The topic is discussed universally and broken into two sections. Fashion makes a powerful statement for both men and women, so it is not specifically a female subject. But men's attitude to women has been challenged with some notable cases.

*An RAF flight lieutenant who ruptured her Achilles tendon after being ordered to run with an 80lb kit bag in high heels has won her case for compensation at Preston crown court.*

*Deborah Burns, now 28, was on the second day of her initial training course at RAF Cranwell, near Lincoln, in August 1996<sup>30</sup>*

Whose responsibility is it when it comes to using footwear? Nicola Thorp was 27 years of age when she made the headlines in 2017. Her bosses at her Portico Agency required her to wear shoes from 2-4 inches high. A Portico spokesman said:

*In line with industry-standard practice, we have personal appearance guidelines across many of our corporate locations. These policies ensure staff are dressed consistently and include recommendations for appropriate style of footwear for the role. We have taken on board the comments regarding footwear and will be reviewing our guidelines in consultation with our clients and team members. McDonnell, 2017<sup>31</sup>*

### *Cannes Festival*

Journalists exposed the facts that not all women want to wear high heel shoes. McLaughlin, a journalist, reacted after the Cannes Festival where actors' flats' were barred from entry at the festival's red carpet event and called 'Flatgate'.<sup>32</sup> Even actress Emily Blunt was on the face of reporting. A reporter told Blunt about the report that several women at Cannes were turned away from the red-carpet premiere of "Carol" because the festival mandates a high-heels-only policy when it comes to footwear. "I think everyone should wear flats, to be honest," Blunt said.

*"We shouldn't wear high heels anymore. That's just my point of view. I prefer to wear Converse sneakers. That's very disappointing."*

Retaliation and rebuttal at the time of Nicola Thorp's event in 2017 ran in her favour from the Royal College of Podiatry (then called Society of Chiropractors & Podiatrists). The response was about safety at work and picked up by the HSE of health and safety executive, a government-backed body who states that their roots date back to 1833. That would put history at the time of the Great Reform Bill (1832), which changed the face of industry. The HSE published findings<sup>33</sup> but, the UK Government rejected calls for a ban on enforced high heel wear. McDonnell says in her article;

*What has not surfaced in the debate so far has been any real objective consideration of safety. Those employers who are keen to project a "glamour" image as part of their business profile also have duties to ensure, so far as is reasonably practicable, the safety, health and welfare of their staff. Slips and trips are a major cause of falls in the workplace and falls on the level, both at work and in public spaces, have been estimated to cost the UK £1billion annually.*

### **Evidence of risk**

Safety, above all, is a prime mover for ensuring that we all minimise accidents at work and, of course, at home. The problems of ankle damage naturally increase as the heel height

---

<sup>30</sup> The Guardian 20<sup>th</sup> March 2002. <https://www.theguardian.com/uk/2002/mar/30/1>

<sup>31</sup> RoSPA <https://www.rospa.com/lets-talk-about/2017/january/high-heels-at-work>

<sup>32</sup> <https://www.huffpost.com/entry/common-risks-of-high-heel>

<sup>33</sup> <https://www.hse.gov.uk/slips/footprocure.htm>

elevates. Studies show that injuries due to wearing high heels (mainly sprains) have doubled over the past ten years - evidence from an Alabama study<sup>34</sup>. Females, once considered shorter than men and needing more height, might have used heels to elevate their vertical size, but in fact, this is not always the case, even though many tower over male partners. The effect of empowerment may have appealed to some possibly. For others, it allowed longer flowing dresses, maybe? It is just as likely some like high heels without any conditions. Hadley Freeman states;

*(if) you understandably think women wear high heel shoes to be taller, [but] you are sorely underestimating the mental minefield that is to be a woman. The Guardian. 15 June 2015. Although high-heeled shoes might be stylish, from a health standpoint, it would be worthwhile for those interested in wearing high-heeled shoes to understand the risks and the potential harm that precarious activities in high-heeled shoes can cause. Gerald McGwin, 2015*

Men's imposing attitudes on women sit poorly with today's view on equality. Nonetheless, it is a person's right to choose what they wish. And so, we need to seek evidence to find out more about the truth. Should those high heels be banned, and should podiatrists be keen to limit their use?

### **Are there benefits to using high heels?**

Cutmore, a podiatrist from New South Wales (Australia), advised health reporter for the Herald Lisa Tait (1998) that while 10cm high heels made legs slimmer, *the Achilles tendon could be destroyed slowly* as the tendon shortened.

### *Drawing some conclusion*

Before we ban any footwear, let us consider the benefits of high heels. While Cutmore knows that a shortened tendon makes walking difficult and causes foot pain problems in flat shoes, sometimes this is not always dependent on wearing high heels all of the time. Flat feet often do better with a heel height as it takes the strain off the inner tendons. While these are not as powerful as the Achilles, they are significant stabilisers of the foot. Moreover, plantar fasciitis occurs in regular shoes rather than high heels from my experience as a jobbing podiatrist for over 40 years.

What does ring true is this. You need to use the proper footwear for the right job. Dress requirements need planning, weather conditions accounted for, and type of walking surface. Stilettos ideally should be interchanged when not required. If you choose to use these shoes, it is your right, but risks and the consequences of those risks could be long-lasting.

---

<sup>34</sup> <https://www.sciencedaily.com/releases/2015/05/150521120924.htm>



## **Can we live without toes?**

The big toe does perform much of the work when we push off against the ground in a movement called the propulsive phase of gait. The foot twists a little and smooths out our forward progress. The remaining four toes also smooth out walking. They provide a spring to the step and offset the load (pressure) across the forefoot.

*If a toe is amputated, will my balance be affected?*

This is a common question and the answer is, of course, it will. Amputation surgery is a salvage treatment reserved for the dysfunctional digit offering fast healing with fewer problems than complex surgery.

The decision to amputate a toe depends upon the patient's deteriorating health, lack of home support and social care. Such surgery can increase mobility and speed up healing from ulcers and painful problems due to irretrievable deformity. There are four critical blood vessels in the toes and often, one or more is no longer viable. Of most significance it is the rapid mobilise that is most attractive where the surgeon wants to offsetting problems from any extended recuperation. The overriding risks imposed by maintaining unsuccessful conservative care allows surgery to become conservative. The answer is you will lose some function but the benefit from reducing pain and infection, and aiding healing offers options.

## **Do toe exercises prevent deformity or help toe deformity?**

I only have to read that picking up pencils with your toes will help, and I know the site probably stands as much chance of producing a chicken as an Easter egg!

However, it would be churlish to dispel the myth that pencils can help without some objective debate. Many years ago, the Distiller Company produced a drug to help with sickness in pregnancy. The net result was congenital disabilities that caused limbs to fail to develop. Those victims who were able to use their feet developed the same dexterity as with hands.

For people without a need to convert toes to functional fingers, the benefit of picking up pencils or marbles would activate the flexor muscles. Here is what one site publishes,

---

*Foot-strengthening exercises promote long-term healing of plantar fasciitis by sharing the load of weight distribution and impact, as well as stabilising gait problems and pronation — both of which commonly cause or worsen plantar fasciitis.*

---

Clever advertising can also cause scaremongering with misleading language. The idea that exercises can achieve so much leaves mixed messages. Search engine returns when making internet enquiries may lead the reader down the wrong path. This is typical where subject matter you seek does not marry to the question asked.

By over activation of the toes in pick up mode, the movement is called flexion. The muscles and tendons worked are flexors. It just so happens that the flexor power in the foot outweighs the extensor power. As most toe deformities result in bending at the knuckle, undertaking excessive flexion exercises accentuates the deformity. The weaker small muscles, previously called worm-like, are ineffective in overpowering the flexors even though they assist in keeping the toe straight.

In contrast with fingers, this is not a problem as the small muscles are well developed. Check out your ability to spread the fingers wide. These are those same muscles in the feet that are weak because the toes are so much shorter.

In the quotation from 'Heelthatpain.com', there is no mention that the fascia, as a band of tissue, can influence the movement of flexion. For the most part, we want to stretch the band, not cause it to contract by picking up pencils. The muscles in the feet function poorly and dedicated exercise on reaching adulthood are not easy, least of all benefitted by toes picking up objects.



## **Arthropathy - Damage inside the foot!**

When it comes to risk from failure to act, then the consequences, while not life-threatening, can lead to a form of disability that affects the quality of life. We need to go inside the joint to consider the effects.

### **How reliable are x-rays for determining joint damage?**

X-rays are valuable. They show deformity, dislocation, bone density, reduced joint spaces, and many affectations with medical diseases or trauma. It is difficult to decide from an x-ray because the image can only provide collaborative information. It is not until we go inside the

joint that we see the effects of damage. We can conclude that x-rays do not provide an accurate picture of inside the joint.

The effect of hallux valgus on cartilage degeneration using the international cartilage repair society grades 0-4<sup>35</sup> have been compared. Bock compared radiographic observation with observation at surgery for 196 patients. Seventy-four per cent of feet showed damage within the first toe joint. The majority (144 /265 feet) were underestimated by radiologists, validated against intra-operative findings using International Cartilage Repair Society (ICRS) and Kellgren-Lawrence, a separate rating scale for degeneration seen on x-rays. The reliability of the ICRS in Hallux Valgus was evaluated seven years later by Smith<sup>36</sup>.

	<b>International cartilage repair society</b>	<b>Kellgren-Lawrence</b>
0	Normal	Normal
1	Superficial lesions / indentation, cracks & fissures	Mild osteophytic lipping, no sclerosis
2	Abnormal lesions extending down to 50%	Moderate osteophytic lipping
3	Severely abnormal cartilage defect through the subchondral bone	Multiple osteophytic lipping, some sclerosis, possible deformity of bone contour
4	Severely abnormal, cartilage defect extending through the subchondral bone	

### **Cartilage damage in Hallux valgus**

If you have hallux valgus, you will get arthritis in the toe? True or false? For every hallux valgus I have corrected, I would estimate 70% have some form of cartilage damage. Don't take my word. Roukis et al. (2005) provided the first mapping exercise on live patients rather than falling back on dissected studies<sup>37</sup>. Sesamoids were thought involved with erosive changes. Roukis cites Dereymaeker (1996), where erosive changes existed under the first toe joint. Such studies tend to use subjects that fall into an older age bracket.

A wider age perspective is preferred where living material is better than studies using those after death. Adaption within cartilage and bone is seen in hallux rigidus (stiff toe) around the dorsal elements of the first toe joint anatomy. Roukis et al. (2005) suggested erosive cases existed in 100% over the age of 50 in a study of 166 feet affecting one or other part of the first toe joint. Jastifer et al (2014) found 91% of his patient cohort had cartilage (osteocondral) lesions in 56 consecutive feet<sup>38</sup>. The numbers may appear low compared to a study by Bock et al (2004), Austria, who reported 73% of their 265 joints (196 patients) had erosions.

<sup>35</sup> Bock, P, Kristen, KH, Kroner, A, Engel, A 2004 Hallux valgus and cartilage degeneration in the first metatarsophalangeal joint J Bone joint Surg (Br) 86-B:669-73

<sup>36</sup> Smith, S, Landorf, KB, Gilheany, MF, Hylton, B M 2011 Development and reliability of an interoperative first metatarsophalangeal joint cartilage evaluation tool for use in Hallux valgus surgery. J Foot Ankle Surg. 50:31-36

<sup>37</sup> Roukis, TS, Weil JLS, Weil, SLS, Landsman, AR. Predicting cartilage erosion in hallux valgus: clinical, radiographic and intraoperative analysis. J Foot Ankle Surg. 2005;44(1):13-21

<sup>38</sup> Jastifer JR, Coughlin, MJ, Doty, JF, Stevens FR, Hirose, C, Kemp, TJ Osteochondral lesions in surgically treated hallux valgus. Foot & Ankle Int. 2014;35(7):643-649. DOI:10.1177/1071100714531234

Jastifer et al (2014) used the ICRS scale for observation damaged and followed 79% patients for two years. Only by following patients for any length can we work out the *timeline effect* applied to treatment.

### **Does cartilage damage make a difference to treatment?**

The grade of cartilage lesions and the extent of damage does agree with the severity of the deformity. As the deformity increases, the number of lesions found increased. As the deformation leads to subluxation, could the loss of the lubrication system lead to drying out of the cartilage? While we cannot assume the incident of erosions in the clinic, we have to rely on imaging or intra-operative findings. We can say that it is more likely than not that patients with pain associated with the first toe joint will have erosions above 50% of cases. What of those without painful symptoms? With insufficient data available on the subject of pain alone, our joint-related research must continue to look for more evidence. We need numbers, and we need controls, but we also need reliable diagnostics. Current research tends to use smaller numbers than older research covering treatment. Ethical consideration and tighter criteria will limit active cohort participation.



### **Is it true sweaty feet are due to poor hygiene?**

Few things put people off at the thought of sweaty feet. According to one source, your feet have more sweat glands than any other part of your body – even more than your armpits. It's entirely normal for your feet to produce more than a pint of sweat in any given day, says Dr Juliet McGrattan in an article for netdoctor<sup>39</sup>.

The term for smelly feet is bromidrosis. The term for sweaty feet is hyperidrosis. But contrary to popular belief, it's not the sweat that causes bromidrosis. Foot odour arises from the bi-product that bacteria produce, offering four prominent smells: sweaty, cheesy, vinegary and cabbage-y.<sup>40</sup>

---

<sup>39</sup> McGrattan, J citing Andersen, F 2019 <https://www.netdoctor.co.uk/conditions/infections/a5560/viruses-and-bacteria/>

<sup>40</sup> Tetro, J Bacteria Give Feet 4 Distinct Odors March, 2020 <https://www.discovermagazine.com/planet-earth/bacteria-give-feet-4-distinct-odors>

*Methanethiol is a key component in the flavor of cheddar cheese. Acetic acid is a result of sugar fermentation — and is better known as vinegar. Byproducts associated with rot, such as propionic acid and butyric acid, can leave feet smelling like rancid cabbage. The most common foot-related chemical, isovaleric acid, is responsible for the smell we call "sweaty." Our noses are up to two thousand times more sensitive to this chemical than the others, and many of us can recognise it even at the slightest concentration.*

---

Bacteria live on the skin of your feet and digest the sweat, producing chemicals thought to be the cause of the smell. The sweat glands are very active in the hands and feet. The value of sweat up to a point allows some grip and traction as the skin is not smooth. Skin sheds its cells (squames) every 14-28 days depending upon your skin type and age and other factors associated with skin conditions. If you rub the skin below the ankle bones (malleoli) as an adult, you will feel a rough build up as you rub. The area of loose skin builds up but soon disappears after a vigorous scrub.

### **How much do feet normally sweat?**

There are 250,000 sweat glands in the feet. Sweat glands known as eccrine glands at maximum capacity may exceed three litres an hour. Nerves and hormones regulate this activity, while men sweat more than women.

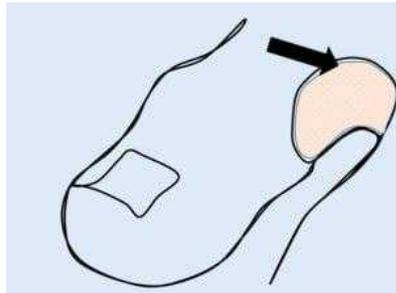
Poor hygiene adds to the build-up of skin squames offering greater bacterial opportunity. However, increased sweating requires temperature, exercise, stress and can be affected by medical drugs and chemicals as in foods. Increased sweating may require medical intervention.

One condition that is not so uncommon is pitted keratolysis. *Corynebacterium* or *Kytococcus sedentarius* are causes of this intense smell. The appearance is pronounced with pits made within the top layer of moist skin turned white. Contact with the skin and aroma make this highly offensive. Similarly, interdigital sweating can lead to bacterial breakdown as in the case of toe irritation seen next.

### **Medical reasons for sweating**

- Injury
- Infection (TB)
- Emotional (psychological /mental/pain)
- Diabetes
- Increased thyroid activity
- Cancers (blood/lymph)
- Skin – pitted keratolysis, tinea pedis (athlete's foot)

In conclusion, sweaty feet are more often not related to poor hygiene alone and may have more to do with a medical problem. Managing bacterial activity is essential, but the primary casualty is footwear.



## **Irritating skin that is not Athlete's foot**

The patient looked down at his toe and saw flaky skin - white and raw. It itched madly, had an odour, and so it was assumed that dastardly condition toe fungus. The condition has various names, including Dhobi's itch. The latter term relates more to the irritation found in the groin and areas where sweat builds up. Athlete's feet is more commonly attributed to this condition and has a fungus rather than bacterial origin.

Athlete's foot (dermatomycosis) is associated with warm climates but can affect us in winter and summer because we fail to dry in an area susceptible to the problem. This annoying condition affects the small toe, or to be more precise, affects the inside cleft of the fifth toe. Full-blown fungal infections can have a ring-like feature (ringworm) and affect skin across the foot and other parts of the body. Blisters emerge as small vesicles predominate the sole and arch in particular. Nails are also affected by fungus but may take much longer to arrive and treatment is often more prolonged.

### ***But, what about an isolated toe?***

The little toe or fifth toe has a cup shape indent toward the base as it connects with the foot. The cup acts to trap water if the area is not dried. The skin becomes soggy (macerated) and sets up an irritation within a short period. If the skin surface (epidermis) sheds or flakes, the lower layer is exposed and cannot combat fungus or bacteria well. The change in odour is noticeable and confined to the scooped out shape. Often by the time the person notices, the problem has hatched.



## Dancers - Going on Pointe!

No one can remain unaffected by the beautiful spectacle dancers put on. The foot balances on the toes. But what of the damage? Look at any popular chick flicks covering dancing. Some hunk will be on hand to nurse blisters and sprains but perhaps not fractures. Pointe dancing (dancing on the extreme ends of the toes with the aid of a toe shoe), as performed by the advanced female ballet dancer, causes unnatural loading of the foot<sup>41</sup>. Conditions such as skin blisters, callus, soft tissue damage and degenerative joint disease can arise.

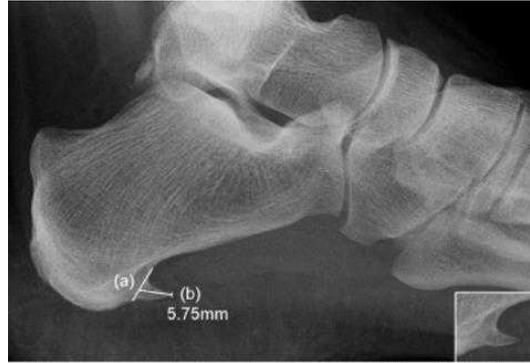
To determine the effectiveness of a ballet shoe, the authors measured the normal pressure distribution on the foot en pointe. Sampling the entire forefoot in the toebox of a pointe shoe showed that pressures arise over the bony prominences and the ends of the toes. The strains on the forefoot account for about 80% of the total force bearing down on the foot. Shear forces on the skin dissipate the remaining energy.

The great toe receives considerable body force, not just going onto 'point' but due to constant impact. The square toebox helps, but the foot takes a battering. Inside these joints, a slow process emerges over time to leave a dancer with a high chance of arthropathy later in life as cartilage does not repair. The rule in not going onto pointe until 12 years of age<sup>42</sup> is considered appropriate as growth centres (plates) are easily injured. According to the International Association of Dance Medicine & Science, the type of dance is important, not the age. In the case of girls, 12 is not the maturation age. Moving into adulthood, the effects of impact trauma to the great toe are all too easy to see. Small bleeds lead to fibrinous attachment, which tears the cartilage and develops new bone formation. If this happens at the great toe, the midfoot and hindfoot, each joint will bear the pain and pleasure of this specialised pastime. It is for the dedicated alone to survive the rigours and effects later on in life.

---

<sup>41</sup> R. G. Torba and D. A. Rice, "Pressure analysis of the ballet foot while en pointe," *Biomedical Engineering Conference, 1993., Proceedings of the Twelfth Southern*, New Orleans, LA, USA, 1993, pp. 48-50. doi: 10.1109/SBEC.1993.247350

<sup>42</sup> Guidelines for initiating Pointe training *J. Dance Medicine & Science* 13,(3)90-92



Johal, KS, Milner, SA Plantar fasciitis and the calcaneal spur: Fact or fiction? *Foot & Ankle Surgery* 18 (2011) 39-41

## Is the heel Spur the cause of heel pain?

Nothing has been so maligned than the heel spur in causing heel pain. Professionals offering musculoskeletal (MSK) skills have to consider a range of potential causes of heel pain. To radiology professionals, it seems pretty clear, as indicated in this x-ray<sup>43</sup>. First of all, let us be clear. The projecting spur is a ledge of bone that goes all the way across. As Johal et al state, the fascia band sits below the so-called spur and does not pull on the calcaneus. Johal looked at 22 patients with a diagnosis of PF<sup>44</sup> and relied on lateral x-rays alone. Cases were selected from Accident and Emergency with a diagnosis of ankle sprain rather than heel pain.



The fascial band shown in a scan (not illustrated) confirms a co-association with fibres of the tendo-Achilles (TA) but not with the bone, causing a spur to coincide at 12 weeks of intrauterine life. The TA and fascia are as one and then diverge into two different planes. The central portion of the fascial band inserts into the inside (medial) heel bone (tubercle), and is often associated more frequency with symptoms.

Consider this; the main body of the calcaneus arises around 6-8 years and joins the main body at 12-14 years. The gap is evident in the juvenile, and the MRI (not shown) shows the

<sup>43</sup> Johal, KS, Milner SA 2012 Plantar Fasciitis and the calcaneal spur: Fact or fiction? *Foot and Ankle Surgery* 18;39-41

<sup>44</sup> PF or plantar fasciopathy is now considered fasciopathy or fasciosis

incomplete ossification. The figure above shows the apophysis where the ledge or spur is in its' primacy.

### **Conclusion**

Yes, you can have heel pain with a so-called spur, but it is just happenstance. Johal's study is compelling, but the size of the cohort perhaps could have been larger. The use of computerised scanning offers the option of a 3D picture.



### **Do corn plasters work?**

Podiatrists deal with corns and callus more than any other professional. The intractable plantar keratoma is the most painful kind of keratin-based lesion and can be confusing. A felt pad filled with salicylic acid (40%) will break down the corn, working on the cellular bonds called desmosomes. So, if the skin is hard and it needs softening, then the keratolytic paste can work.

A scalpel in the right hands can reduce surface skin faster without the lengthy wait or risks of pastes which can cause unnecessary damage. However, not all corns are simple. Cross-sections through tissue from surgically removed corns often highlight inflammatory changes. These types of corn are unlikely to clear because a) the changes are too chronic, b) there is a pre-existing fixed toe deformity. The sole can throw up even more concerns about what lies below the skin and makes clinical examination alone difficult.

Hard skin with a crusty centre can be associated with cystic bursae deep in the tissue of the foot. The fallacy that surface management alone can provide effective treatment is misleading. Timpson (2005)<sup>45</sup> considered the effectiveness of debridement as being short-lived. In reality, most debridement is only effective between 2 days and one month.

Dealing with complex skin problems in feet falls outside pedicure and a professional clinician with medical knowledge should be consulted.

---

<sup>45</sup> Timpson, S, Spooner, S K (2005) A comparison of the efficacy of scalpel debridement and insole therapy in relieving the pain of plantar callus. *British Journal of Podiatry*. 8(2):53-59

## Conclusion

Corn plasters can work but removing the bulk of skin. The use of a scalpel is more effective. The type 4 callus<sup>46</sup> (shown) with its damaged surface is called an 'intractable keratoma' because it fails to clear with treatment. Corn plasters seldom do more than soften the surface. New established corns will benefit from corn plasters as long as the deeper tissue is not damaged or infected with viral tissue.



## Are corn and callus knives dangerous?

There is no doubt that people have been reported using Stanley knives as a method of removing callus. The question is can this be done safely. No matter what podiatrists advise, and while outlets sell apparatus, then sharp instrument will be used.

*There are two viewpoints.*

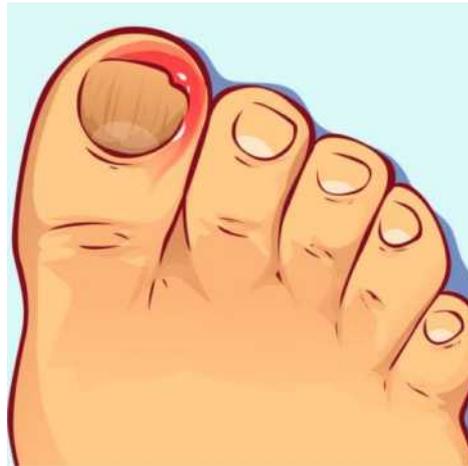
The first is never use anything sharp that will cut because it is easy to slip. Remember advertisements are designed to look easy and make a sale. Many people find the ease with which techniques can be copied are not always that simple. It is not myth that knives are dangerous as we all know how easy it is to make a nasty cut in the kitchen. Feet are notoriously difficult to reach and eyesight plays a factor. The second viewpoint is related to cleanliness. Blades should be sterilised after each use. Disposable blades are the industry standard.

---

<sup>46</sup> Tollafield DR Clinical Photographic Observations of Plantar Corns and Callus associated with a nominal scale Classification and Inter-Observer Reliability Study in A Student Population.. Journal of Foot and Ankle Research 2017.10,45:2-7

### **What can you use?**

Simple skin that has little depth and complicated blemishes can be reduced with soft abrasive sponges, hand files or rotary drums now on sale. The cheese slice blades are equally dangerous although less so than open blades. It is better to stay safe and consult a clinician trained to manage feet.



### **Myths about ingrown toe nails**

Publicity and the nail are bedfellows, often for the wrong reason. The blunt, if not misinformed joke that someone is disabled and an inference made that they shouldn't be as it is only an ingrowing toe nail, perpetuates this anecdote. As a podiatrist, I have had an ingrowing toe nail, albeit mild compared to many of my patients, and the inconvenience and discomfort is far from amusing.

Whilst training, I was informed by my old Alma Mater that you could die from an ingrowing toe nail. It appeared to stretch the truth by more than a mile. The only way you can die from an ingrowing nail is by spreading infection through cellulitis and septicaemia. Sadly this happened in Australia when a teenager became sick after was the clinical signs of danger had been ignored. The fact was far from a fable in this case.

Those with poor immunity are at most significant risk and include patients treated with powerful drugs to suppress cancer cells. Immunity is about having sufficient specialist defence cells to ward off disease.

### **Can I cut a 'V' in the nail to help?**

No, this does not work and is a long-held myth. The nail grows from different parts of the toe and nail bed. While the front edge (hyponychium) contains some growing cells, you do not want to cut through this as it will bleed and still offer no benefit. The only way to stop a nail from growing is to destroy the nail growing cells.

### *Naming the beast*

Ingrowing toe nail has several names. Ingrown is the commonest and suggests part of its origin is growing into the flesh. If you are playing scrabble or want to impress others, you could say I have an onychocryptosis (on-ee-koh-kryp-toh-sis). IGTN for ingrowing toe nail is the shorthand version the health care professions like to use.

The IGTN presents with three types of nail pain. In hands, we see the 'Whitlow', the skin on one or other side of the nail bed is inflamed and painful. A small amount of white discharge (pus) may be visible.

Paronychia refers to the inflamed skin around the nail and common to both toe and finger, so Whitlow just adds a name to provide further confusion. To appreciate the three toe types of IGTN, we need to know a bit of anatomy. Don't worry, I will keep it simple.

### **Ingrown nail variations**

The hard nail made from packed cells called keratin sits on the softer part at the end of the digit covered by the nail plate. It comprises a nail bed and two side grooves. The grooves form gutters that we call **sulci** (sulk-eye) or sulcus if singular. It is in the sulci that the problem occurs. The nail builds around a small area of inflammation. Let's deal with each of the three scenarios.

### *Shape*

The shape varies widely from almost flat to curved as the nail sits in the sulcus. The more curved the nail at this point, the greater the pressure against the skin and irritation arises. The skin responds to pressure and thickens as a protective method. As the bulk of skin (callus) increases, it causes discomfort.

Some nails are very curved (U.S.A- '**incurvated**'), pinching off the skin. Some people may be affected only on one side. The incurved nail is the most common and will form callus in the sulcus. The unique name – onychophosis is given to this hard skin. If you wonder about the terms, anything starting with **onycho-** means nail.

Hard skin in the groove is not always painful, but given the right environment, such as a sporting activity that pushes against the great toe, or a pair of shoes that squeeze the nail against the groove and the underlying bone (phalanx), then pain can arise—often called by people as an ingrown toe nail erroneously.

### *Break in skin*

A true ingrown toe nail bears the name onychocryptosis. The nail edge penetrates the sulcus sufficiently to create two critical conditions. Firstly, the skin is inflamed, and secondly, the wound created cannot heal and so overreacts. This tissue is called hypergranulation. As the skin attempts to heal, the repair process sets up a weak network of tiny vessels that, if disturbed, bleed. The colour is red and looks like a cherry on the side or end of the toe and requires professional help at an early opportunity. Sweat makes matters worse and, of course, can cause that offensive smell which gives feet a lousy name. The last ingredient that arises is infection. As long as the inflammation does not progress up the toe this can be managed with antiseptics.

### *The Bridge*

Of all the nail conditions mimicking the ingrown nail, one remains unwritten. The bridge is my reference to the top layer of skin (epidermis) adhering to the nail plate within the sulcus. As the nail moves forwards, the resistance of the bridging effect sets up an inflamed state. This condition can overlap with hard skin in the nail groove (onychophosis) but is more likely to start inflammation or callus build-up. As podiatrists, we do not recommend poking down the groove (sulcus). Maybe it is not as bad as poking around in the ear, but it is difficult to see what you are doing. As ear professionals have specially designed instruments that minimise damage, we use similar instruments. An added local anaesthetic can ease discomfort and make inspection more thorough.

### **Do you have to suffer pain?**

When it comes to treatment, you should not suffer pain. Modern foot care involves being offered a local anaesthetic as a standard today.

You should not experience more pain than needed as you would expect from a dental examination and treatment. If the clinician cannot provide this service, ask to see someone who can offer a local anaesthetic in an outpatient location. Only registered people trained as podiatrists or medically qualified people can provide local anaesthetics. If you are not provided pain relief, walk away.



### **Can antibiotics treat the ingrown nail?**

Antibiotics are not the correct treatment for an ingrown toe nail, although the infection will clear temporarily. Nail eruptions will continue until professionally managed. Antiseptics and good cleaning are imperative.

While patients should help themselves solve problems and prevent foot ailments, there is a narrow boundary between self-help and seeking professional help.

Ingrown nails are not a condition to be managed without experience. At the first sign of inflammation, use a sterile plaster and cover the skin and nail for 24-48 hours. If inflammation spreads or the toe swells, seek help.

### **When should antibiotics be used?**

In truth, never. In reality, it depends if there is an actual infection and whether it has spread. Antiseptics still offer a place to help people offset against mild or early signs of infection. If you are healthy and have uncontrolled diabetes or have immunological conditions, use

antiseptics at the earliest opportunity. Any blood condition where the white blood cell count is lowered, as, in leukaemias, require urgent antibiotics. Antiseptics will reduce the bacterial count lowering the risk of spread. A covering for a short time may soften hard skin to settle inflammation. If no improvement arises within 48 hours, then seek professional help.

All antibiotics will stop any infection for a period. If a doctor gives you more than one course of antibiotic, then ask to see someone who specialises in managing ingrown toe nails. Today more than ever, antibiotics must be reserved for severe infection and not heralded as a cure-all. Unless your infection spreads to your ankle or up your leg, DO NOT use an A&E department. A&E departments are best for saving lives and stabilising serious medical problems, and this is where their primary skill lies. Other than this, junior doctors are happy to learn on your foot. The worst ingrown nails include abscesses and enlargement of the toe.

### **Who to go to?**

When Clare Laxton carried out an audit study between the medical profession and podiatry profession in 1994, she reported that podiatrists performed better than the medical profession for nail surgery results. The group she looked at included GPs, orthopaedic and general surgeons.<sup>47</sup>



### **Should we put chilblains in hot water?**

Ever suffered from cold feet, feet that are numbingly cold at that? Cold is unpleasant and the temptation to warm the skin fast is a strong emotional attraction for a quick fix. The answer to the question should we use hot water may be evident to some.

Chilblains (also called pernio) are localised inflammatory lesions of the skin associated with cold exposure. Note that pernio-like lesions have been identified as a potential marker for coronavirus disease 2019 (COVID-19). Controversy exists as to whether these lesions are a late-stage manifestation of COVID-19 itself. A secondary blood clot tendency created by COVID-19 may be associated with passive activity and the cold. Chilblains typically develop acutely. The lesions are either single or multiple and may vary in colour from red to violet

---

<sup>47</sup> Laxton C. An Audit of Forefoot Surgery in Suffolk. I. Epidemiology & Community Health. Conference proceedings from 38th Annual Scientific Meeting from the Society of Medicine, Leeds 14-16th September 1994

and characterised by itching or burning pain. If Chilblains do not settle within a few days, blistering and ulceration can even lead to infection. Chilblains are typically located around the skin at the end of fingers and toes.

Much of the information in the last paragraph has been simplified<sup>48</sup>. Small vessels in the skin have a unique control on blood flow. Opening and shutting down the cross section (lumen) within blood vessels is called vasodilation and vasoconstriction. Local thermal control of cutaneous blood vessels is associated with local sensory nerves and nitric oxide. Local cooling of the skin can decrease skin blood flow to minimal levels. During menopause, changes in reproductive hormone levels substantially alter thermoregulatory control of skin blood flow. This altered control might contribute to the occurrence of hot flashes. In type 2 diabetes mellitus, the ability of skin blood vessels to dilate is impaired. This impaired vasodilation likely contributes to the increased risk of heat illness in this patient population during exposure to elevated ambient temperatures. Raynaud phenomenon and erythromelalgia relate to disorders of local and/or reflex thermoregulatory control of the skin circulation<sup>49</sup>.

If we intervene with hot water, we cause a sudden interference with the thermoregulation. Heat can damage the skin, but the changes brought about by heat accelerates the vessel diameter change from closed down and narrow to opening up and wide. The sudden surge of de-oxygenated blood releases toxic build-up from when the vessels were narrow during the cold. Gentle warming allows better dispersal. Pain arises because the nerves and tissue release chemicals. Dry warming with a towel or blanket is likely to create less damage.



## **Are Autoclaves better than antiseptics?**

If antibiotics are not as useful for local wounds then why not use antiseptics. Antibiotics have disadvantages of allergies, causing bug resistance and stomach upset. Why would a steriliser not be better than a solution of antiseptic liquid? All may not be as it seems.

---

<sup>48</sup> Edgerton, CC. Medscape [https://reference.medscape.com/viewarticle/850362\\_3](https://reference.medscape.com/viewarticle/850362_3) 2 April 2021

<sup>49</sup> Charkoudian, N. 2003 Skin blood flow in adult human thermoregulation: how it works, when it does not, and why *May*;78(5):6,03-12. doi: 10.4065/78.5.603

At my training college, we had to change from Dettol (chloroxylenol) to Hibitane (chlorhexidine). Dettol was growing the deadly Pseudomonas bacteria. Of course, the advert today says this former named antiseptic kills 99% of germs which sound reassuring. But consider this, if the 1% of germs are not killed and carry significant harm, meaning if it gets into the body and thrives, well, the rest you can work out. Before hepatitis B and AIDS / HIV were identified, viruses were still known to cause significant disease. Resistant to many treatments, viruses succumb to heat. Clinicians take no chances and throw the best methods called sterilisation at the bug, be it a virus, bacteria, fungi, protean or prion based infection.

Here is a curious finding. In 1979 I experimented with four methods of bug-killing media. The autoclave was the top of the tree as the only steriliser, while disinfectants included hibitane solution and formaldehyde. The last method was controlling and wiping the same instrument without any other intervention. Sterilisation means killing 100% of germs, and disinfection means reducing the population of those bugs. The aim is to destroy all harmful organisms. You cannot autoclave a wound, so antiseptics and disinfection still must co-exist. Here is the conclusion from the study.

---

*Hibitane and formaldehyde seemed to perform similarly, while the autoclave performed less effectively, although the margins associated with percentage difference were narrow. All methods recorded some outliers put down to operator error. Hibitane was produced with careful attention to the correct strength, but incorrect dilutions and irregular replacement could increase liquid contamination. Aesthetically the autoclave is more presentable and theoretically harder to interrupt cycles. While effective, the formaldehyde cabinet was considered less attractive because of potential problems with sensitivities to the operator and environment.*

---

These findings were interesting because they looked at one instrument, a set of nail nippers and a scalpel. The use of disposable blades like sterile gloves today is the standard expected. In many cases, sterile metal instruments have been used as one-time use alone. Outside the clinic this may make sense with infected wounds, but the system is costly and where instruments are not recycled the environment will suffer. In several cases, sterilisation was not achieved with the autoclave. Sometimes autoclaves cannot penetrate small areas without pre-sterilising cleaning. The truth behind autoclaves being superior is sound but the system is only as good as its operator.





It is hope that this book has been both informative and cleared up some myths about feet as well as providing reliable facts and thoughts. When I first started writing this book was half the size. Having come to the end point there is still so much more one can write.

If you follow me on Facebook @david.tollafeld or LinkedIn or Twitter (@myfootjourneys you can read more at ConsultingFootPain.

I will leave you with these thoughts. Always be careful what you read and do not believe all promises made. When writing my book on bunions (published in 2019) I saw other books with a similar title that started with; '*how to cure..*' and '*how to fix a bunion without surgery*'. These are misleading and the content was ambiguous. Often highly priced, with few pages, often a naff cover and written with little expertise. So, beware!!!

**Happy reading**

David R Tollafield

## About the author



David is a former consultant podiatric surgeon and educationalist having taught at the former University of Northampton for ten years. He has also acted as a clinical tutor at undergraduate and postgraduate level. He remains a registered practitioner with the HCPC and is a Fellow of the Royal College of Podiatry in podiatric medicine and podiatric surgery.

During his 43-year career, he has travelled widely and given talks and lectures around the world. He is passionate about his profession of podiatry and promoting good foot health and knowledge.

ConsultingFootPain (CFP) is a non-clinical health education brand established first in 2014 and relaunched in 2018 in its current format under Busypencilcase Reflective Communications (2015).

Now retired from clinical practice, David is a full-time writer-author and public speaker and lives with his wife in the West Country. He is a member of the local amateur dramatic society and a keen medical and military historian. During 2021 he started to include fiction in his publications commencing with '*Fatal Contracts*'. He has also written a children's book for his grandchildren (unpublished).

## Index

Abscesses.....	53	Empowerment.....	39
Accessory bones.....	14	Erythromelalgia.....	54
Achilles.....	31, 38, 39, 47	Excavation of bodies.....	36
Acupuncturists.....	17	Exostosis.....	18, 19, 34
Acute.....	12	Extended scope practitioners.....	17
African native.....	30	Family doctor.....	34
AIDS / HIV.....	54	Fascia.....	41, 47
Amputation.....	40	Fascial band.....	26, 47
Andy Murray.....	12	Fibrin and myxoid degeneration.....	19
Ankles.....	19	Fitness centres.....	10
Anterior (transverse) arch.....	28	flat feet.....	13,24-27, 28, 31
Antibiotics.....	52	Flatgate'.....	38
Arches.....	24, 25	Foot care assistants.....	17
Army.....	24, 25	Foot Health Practitioners.....	17
Arthropathy.....	46	Foot mobility.....	27
Athlete's foot.....	44, 45	Foot soldier.....	24, 25
Athletes.....	12, 24	Forensic podiatrist.....	29
Attitudes on women.....	39	Galvani.....	24
Autoclaves.....	55	Ganglion (ganglia).....	10, 18, 19
Bacteria.....	43, 44	Gene.....	20, 33
Bennett.....	23	General medical practitioner.....	17
Biomechanics.....	10, 27	Gout.....	35
Blood clot.....	53	Great toe.....	15, 46, 51
Blood vessels.....	40, 53	Greek foot.....	23
Bromidrosis.....	43	Hadley Freeman.....	39
Bumps.....	18	hallux valgus.....	15, 18, 19, 28, 30-34, 37, 42
Bunion.....	18, 21,30, 59	Harris and Beath's work.....	25
bursa.....	19, 22	Haydn Kelly.....	29
Calcaneus.....	25, 26, 47	Heel counter.....	29
Cancer.....	11, 16, 17, 50	Henry VIII (1492-1547).....	35
Cannes Festival.....	38	Herald Lisa Tait (1998).....	39
Cartilage.....	42	High heeled shoes.....	31, 37, 38, 39
Cellulitis and septicaemia.....	50	Humpback bridge.....	26
Chilblains.....	10, 53	Hyperhidrosis.....	43
Chinese bound foot.....	36	Hyponychium.....	50
Chiropody.....	16	Infected wounds.....	55
Chronic.....	12, 19, 48	Inflammation.....	51, 52
Circulation.....	11, 54	Ingrown.....	51, 52
Citron.....	26	Injury.....	11, 12
Clare Laxton.....	53	International Association of Dance Medicine & Science,.....	46
Corns and callus.....	48	Interossei and lumbricals.....	21
Courtesans.....	35	Ipswich, England, Mays.....	36
COVID-19.....	53	Isovaleric acid.....	44
Cuboid.....	26	Joints.....	10, 12, 13, 17, 19, 26, 42, 46
Cuneiforms.....	26	Joseph Lister's.....	20
Cutmore, a podiatrist.....	39	keratin.....	16, 48, 51
Cancer.....	12, 46	knee cap.....	14, 15
David Beckham.....	35	little toe.....	45
Dentistry.....	16	Local anaesthetic.....	52
Diabetes mellitus,.....	53	Long medial arch.....	25
Disinfection.....	54	Louise XIV.....	36
Dr Ana Deissler.....	36	Low arch.....	24
Dudley Morton.....	23	Mary Wollstonecraft.....	36
Durlacher.....	20, 21, 23	McLaughlin.....	38
Egyptian feet.....	23	Medical specialists.....	17
Emily Blunt.....	38		

## David R Tollafield

Medications.....	17	Sesamoids,.....	14
Metatarsal length.....	23, 31	Shin splints.....	27
Metatarsalgia.....	13, 21	Shoe wear.....	28, 31
Metatarsals.....	23, 24, 28	Skin.....	10, 16-19, 30, 44-49, 51-54
Middle East.....	36	Small muscles.....	24, 41
Morton Altman.....	25	SOCO (UK).....	29
Morton's neuroma.....	20, 21, 22, 23, 37	Splints.....	32
Musculoskeletal system.....	10, 12	Spur (heel).....	47, 48
Nails.....	5, 10, 16, 20, 50, 51, 52	Statuses.....	23
Navicular.....	13, 26	Sterilisation.....	54
Nerve pain.....	21	Stiletos.....	39
Neuroma.....	10, 21, 22, 23	Sweat.....	44, 51
Nicola Thorp.....	38	Sweat glands.....	43, 44
Onychocryptosis.....	51	sweating.....	44
Onychophosis.....	51, 52	Tabi sandals.....	31
Orthopaedic.....	17, 31, 53	Talus.....	13, 14, 25, 26
Orthoses.....	27	Tendons.....	13, 15, 19, 26, 34, 39, 41
Osteochondral.....	42	The Bible.....	19
Osteopaths and chiropractors.....	17	The Health and Care Professions Council.....	17
Pain.....	12, 32, 54	The nail.....	50, 51, 52
patella.....	14	The sole.....	48
Pedicure.....	16	Thermoregulatory control.....	53, 54
perniosis.....	53	Thomas G Morton.....	20
Physiotherapists.....	17	Timeline.....	11, 12, 43
picking up pencils.....	40	Tissues.....	10, 12, 19, 27
pitted keratolysis.....	44	Toe length.....	23
Podiatric medicine.....	16	Toe splints.....	32
Podiatric surgery.....	17	Toebox.....	46
Podiatrists.....	17, 38, 48	Transverse arch.....	25, 26, 28
Podiatry.....	5,16,17,30,38,48,53,56,59	Warts.....	10
Poulains.....	36	Weight gain.....	11
Pseudomonas bacteria.....	54	White blood cell count.....	52
Pulleys.....	14	Whitlow.....	51
Raynaud phenomenon.....	53	Width of shoes.....	35
Safety.....	38	X-rays.....	14, 23, 25, 41, 42, 47
Sensations.....	23		

## **Books by the author**

(available from Amazon)

### **Non-fiction**

Podiatrist on a Mission. The Genesis of a New Profession\*

Selling Foot Health as Podiatry\*

Projecting Your Image. Conference to Village Halls\*

PowerPoint is More than a Slide Programme

Bunion Hallux Valgus. Behind the Scenes\*

Morton's Neuroma. Podiatrist Turned Patient: My Own Journey\*

*With Linda Merriman*

Clinical Skills in Treating the Foot

Assessment of the Lower Limb

### **Fiction**

Fatal Contracts\* (due out 2021)

**\*In paperback and e-book format**