

Podiatry



**ASSIGN
BUSTER**

Hallux abducto valgus (HAV) is a condition in which the joint present in between the first metatarsal and the phalange undergoes degeneration (in association with osteoarthritis). The condition gradually progresses and is characterized by deviation of the toe, related with prominence of the medial portion of the first metatarsal head. The first metatarsal head gets dislocated from the hallux sessamoid, and both these bones are displaced laterally. HAV more frequently occurs in women compared to men (3: 1 or 4: 1).

The angle between the first metatarsal and the second metatarsal in the normal foot is between 8-12 degrees, and the long axis of both these bones is near parallel to each other. This framework provides structural integrity and functional efficiency. The forefeet are one of the most load-bearing structures present in the body. All the metatarsals articulate with the proximal phalanges to form the Metatarsalo-phalangeal joint (MPJ's). In the greater toe, the architecture is a bit different, due to the presence of 2 sessamoid bones.

Actually in the first MPJ system, two joints are present in the common capsule, along with related ligaments, tendons and muscles. Between the first metatarsal and the proximal phalanx, a ball-and-socket joint is formed. The plantar (towards the sole surface) of the first metatarsal and the dorsal (back) surfaces of the 2 sessamoids form a rounded groove. The head of the first metatarsals are bigger than the other metatarsals and are quadrilateral. The joint permits bending in a dorsal and plantar direction. It also permits abduction, adduction, inversion and eversion movements to a slight level.

It appears ball-shaped to a joint element with the proximal phalanges. The sesamoids are present below the head of the first metatarsal. Load from the soles (plantar surface) is transferred to the metatarsal head. The sesamoids vary in shape from semi-ovoid, bean-shaped and round. Two sesamoid bones are presented, mainly, medial and lateral. Most of the ligaments and tendons that form a part of the joint complex have insertions into the sesamoid bones. Sesamoid bones reduce the abduction forces onto the joint. HAV is a very common condition in the US, affecting about one percent of the adult population.

With age (from the teenage period), the incidence of HAV increases. The hypothetical case is in a woman of 40 with a complaint of painful protrusion in the first metatarsal region (bunion) in the right foot. She did not have any significant findings in her medical history, except that she was sensitive to pentazocine. She also used tobacco and alcohol frequently. She had undergone a surgery to treat a similar bunion in the left foot. The patient's family history did not suggest an existence of foot problems. The patient is working as a hair dresser.

Her occupation demands that she has to work standing for about 8 to 10 hours a day. Due to the occupational demands, she had to wear narrow and high-heeled shoes. Besides, as he worked in a beauty saloon that had limited space, she often was in constant contact with objects with her feet. She also gave the history of receiving injury to the right foot repeatedly. She was also in the habit of using her feet to raise the chair during beauty trials. Hence her foot was often injured. The patient had a history of wearing tight shoes, right from the adolescence stage.

The shoes she wore were narrow-toed and high-heeled. She was on the shorter side and hence preferred to make up some height through her footwear. The bunion tended to compress her big toe and forced from its normal alignment. Besides, she tended to walk a bit excessively. She was slightly over-weight and tended to perform most of her work while standing up. A thorough physical examination was done and the presence of a hallux abducto valgus defect was detected. Besides, hammer toes in the second, third and fourth metatarsals and a bunion present in the first metatarsal was also identified.

The patient was asked to bring her footwear and wear it during examination. The footwear applied undue pressure on the foot. The front portion of the footwear had pointed and outwardly angulated, which caused a lot of friction and the medial side of the foot. This resulted in formation of the bunion. The manner in which the individual walked suggested that she was basically flat footed. An X-ray was taken from the front to study the defect. It demonstrated that the first inter-metatarsal angle was at 13° , and the hallux abductus had an angle of 26° .

The sesamoid bone was in position 5 and the metatarsal abductus was in an angle of 10° . The normal inter-metatarsal angle is about 8 to 12 degrees. Several laboratory tests were also conducted in order to determine the blood sugar levels, presence of systemic disorders, and joint-degenerative disorder. However, the findings obtained from such tests were near normal. In this case, HAV developed due to the long-term use of tight or ill-fitting shoes. The hallux is kept in an abducted position resulting in overstretching and deviation of the soft-tissues.

However, several other contributing factors were also present.

Biomechanical instability is one of the most important contributing factors.

During walking, the mid foot region exhibits some amount of internal rotation so that abnormal forces get neutralized. Sometimes, the internal rotation forces in the mid-foot region are too high resulting in excessive mobility. The individual finds it difficult to walk. The bunion may have developed due to placing the foot in a position against normal alignment. Continuous use of the foot when ill-fitting shoes are worn, results in weakening of the anterior metatarsal arch.

The foot gets more flattened and the MPJ joint projects in a wrong direction. The ill-fitting shoes provide pressure to the area resulting in development of the bunion. The bunion is produced because the overlying fibrous cartilage and bone gets inflamed due to chronic irritation. Some researchers even suggest that when the hallux deviates sideward on the metatarsal, the articular cartilage gets degenerated and the bone present below the cartilage gets worn out. When normal forces are exerted on this worn out bone, regeneration and resorption occurs.

Bone is formed on the medial aspect of the metatarsal head resulting in a medial prominence. The sesamoid bones of the first MPJ joint have been located slightly laterally. This abnormal positioning leads to lesser opposition of action on the abduction of the hallux. Many factors have to be taken into consideration during the treatment of HAV. The individual was advised to take good care of the feet and to completely avoid wearing the pointed high-heeled shoes. Along with that rest, application of ice and elevation of the foot for sometime during the day was suggested to provide relief.

As there was a chance of damaging the area between the first and the second toe, soft pads were given. This pad also prevented damage from outside objects (BSFA, 2007). The bunion was slightly infected along with abscess formation. Hence, the abscess was thoroughly incised and drained, and a dressing was given along with antiseptic ointments. A course of antibiotics was also given for a few days. The patient was not a diabetic, and hence general measures were followed during wound healing (BSFA, 2007). The patient also required certain changes at the workplace.

The individual was advised to take complete rest for a few days until pain and discomfort levels reduced to appropriate levels. Work could then be performed in a slightly modified environment. Objects that were repeatedly causing injury to the feet were removed. The individual was advised to start using softer shoes, that had a wider area to accommodate the toes and had greater amount of foam that could protect the feet from injury. The individual was also given soft insoles to help reduce the pain during walking and standing.

As the pain was severe, corticosteroids injections were frequently required to help reduce inflammation (Richardson, E. G, 2003). Surgery may be required when the functioning of the foot is seriously affected, if the pain recurs, or if the individual does not find the shoes comfortable, surgery is required (Patent Plus, 2004). The bunion should be removed under anesthesia. Besides, the ligaments that bring about toe movement should be released (BSFA, 2007). It may be necessary to insert specialized wires and pins for a few weeks so that healing takes place along the premeditated lines.

The foot should also be immobilized for a few weeks to ensure that not much load is applied during the healing stages (BSFA, 2007). The wires and pins can be removed after the healing has been completed. The surgeons should ensure that the fixation provided during the surgery is stable. If the fixation is not proper with the internal fixation devices, the forces may be transmitted abnormally resulting in recurrence of the symptoms. During the follow-up visits, the pain levels, and the range of motion of the foot should be checked.

Radiographs and CT scans may be required after 5 months to ensure that the callous formation is proper (Richardson, E. G, 2003). If the individual has a severe hallux valgus deformity, then the Keller's arthroplasty may be required. It involves removal and reshaping of the bone in the 1st MPJ and removal of the medial eminence of the first metatarsal (Richardson, E. G, 2003). Another technique known as Kalish technique (alteration of Austin's bunionectomy) can also be utilized to correct HAV. A study was conducted on 172 patients to determine the effectiveness of this technique.

In this technique, rigid internal fixation devices are used along with osteotomy to reduce the hallux abductus angle, inter-metatarsal angle and the position of the tibial sesamoid. Weights can be moved almost immediately and soft shoes can be worn after 2 weeks. Screw fixative Chevron osteotomy is a specialized surgery that utilizes specialized screws to fix the dislocation. The risk of recurrences or degeneration was low compared to other surgeries (Viehe, R. , 2003). Frequent foot exercises are needed to help improve the mobility and strength of the foot (BSFA, 2007).