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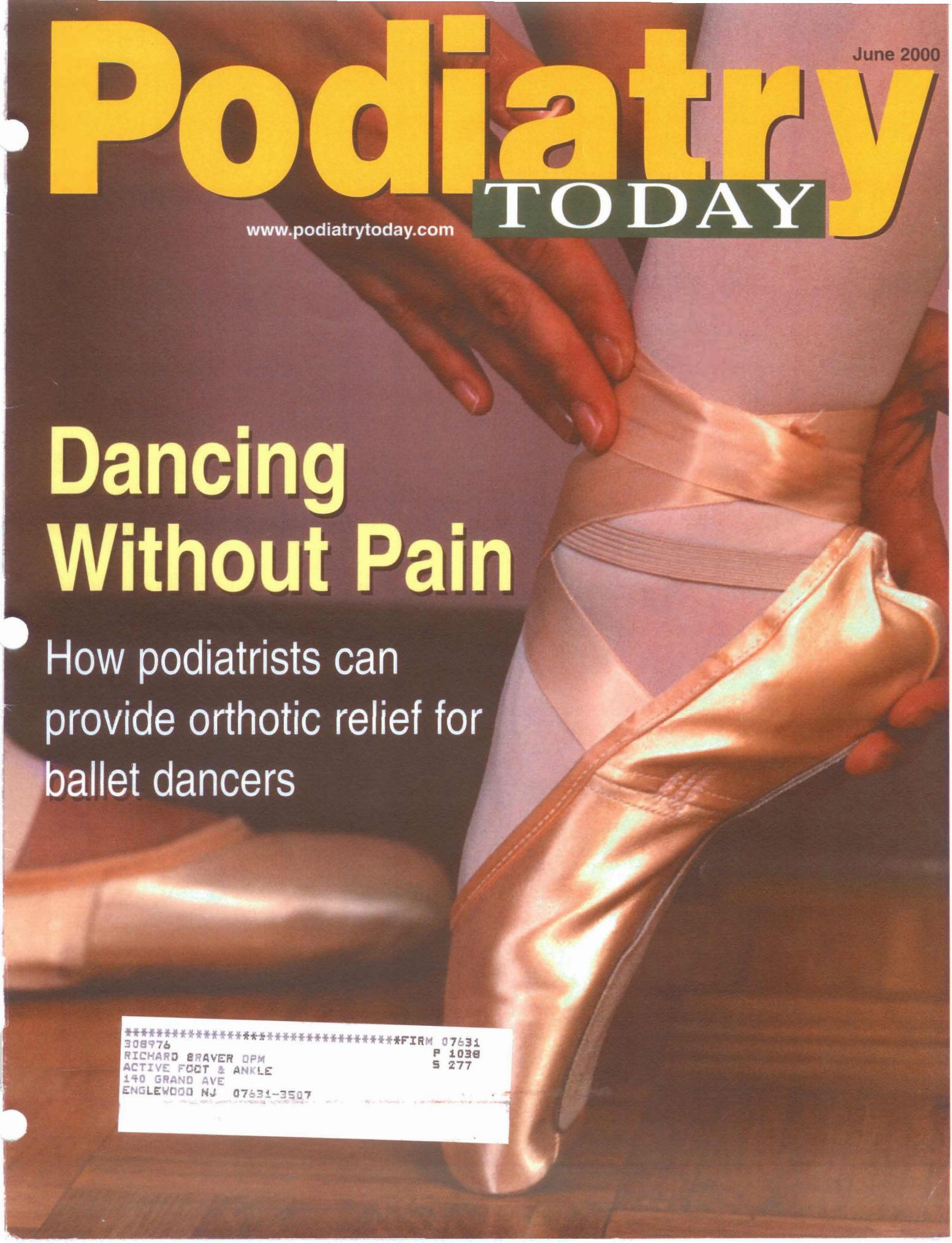

Dancing Without Pain

How podiatrists can provide orthotic relief for ballet dancers

performing on a shock absorbing floor. Taping and padding of the foot and leg are helpful in reducing pronation, supporting the arch and physically holding the muscles firmer against the leg bones. Ballet orthotics can be helpful in reducing pronation and providing shock absorption.

Other Common Injuries

4. Plantar fasciitis. Strain to this ligamentous tissue occurs from jumping, pivoting and landing movements. Malalignment leading to strain can be a result of one's inherent foot structure or from a forced turn out of the foot by the dancer. This usually results in excessive pronation with subsequent strain of the arch and increased stress upon the plantar fascia. Dancers with high arches and tight fascia are also susceptible to fascia strain during repetitive or high impact movements.

Treatment: Taping and padding the dancer's foot with an arch support often helps to reduce strain to the fascia. A ballet orthotic can also help control excessive pronation and absorb shock.

5. Posterior impingement syndrome. Dancers often rise up onto the balls of their feet and function in demi-pointe and in full-pointe. However, if there is an enlarged lateral process of the posterior talus or if an adjacent bone called the os trigonum is present, then a bony impingement may occur during these extreme plantarflexed positions of the ankle. The posterior process of the talus or os trigonum may abutt into or impinge upon the soft tissues between it and the tibia or calcaneous. With repeated impingements, the soft tissues may even thicken, leading to a chronic condition.

Treatment: Corticosteriod injections often provide relief, but many times the offending bone must be removed and the soft tissues must be carefully inspected for additional pathologies.

On Pointe Relief

There's no question that dancers have the potential to easily injure their feet. However, orthotics can go a long way in providing relief and can even prevent some of the more common injuries. Preventing injury and helping to alleviate the stress ballet puts on the foot will keep your dancer patients happy while on pointe.

Editor's Note: Dr. Braver is a podiatric physician for several dance schools. He is a Fellow of the American Academy of Podiatric Sports Medicine and practices at the Active Foot & Ankle Care Center in Englewood, NJ. ■

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requires the dancer to repeatedly strike the foot against the ground in a forward kicking motion.

The orthotic is extremely flexible in the heel to toe direction, enabling the dancer to roll up onto the ball of the foot without losing power or gracefulness (see Fig. 3). However, it is firm at the forefoot from medial to lateral in order to control excessive pronation or supination.

Fig. 4. The thong retention strap, as seen between the first and second digits, prevents the device from moving proximally.

Device Works Well For Novices And Experienced Dancers

The device has been extremely well received by dance teachers to help "train" beginning dancers that exhibit poor technique due to structural malalignment. Young dancers and those with significant structural problems adapt to the new device pretty quickly. Experienced dancers with chronic injuries should ease into using the device over a two-week period. Recreational older dancers with poor alignment or foot/leg pains may also need to ease into the devices as well, but once they have made the adjustment, they have often remarked how dancing is fun again.

Final Notes

In most instances, the Braver Ballet Orthotic improves coordination, enhances proper dance technique and ultimately alleviates torsional stains and injuries.

— Richard T. Braver, DPM

Editor's Note: For more information on the Braver Ballet Orthotic, call (800) 444-3632.

jumping occurs by pushing off the forefoot and most of the landing from leaps puts pressure on the forefoot.

There is also a multitude of pivoting movements that cause strain to the sesamoid complex. Indeed, these movements can lead to hyperextension or hyperflexion injuries, especially in the dancer who goes on pointe. Fractures to the sesamoids, whether from compression or avulsion, are common among dancers.

Treatment: Place a sesamoid cutout pad in the ballet shoe or on the foot. For chronic problems, consider using ballet orthotics with a first metatarsal cutout to reduce pressures to this area. A spica taping to limit joint motion may also be indicated.

Reduce Metatarsal Stress

2) **Metatarsal Bursitis/Capsulitis.** Due to the high amount of rising up onto the balls of the forefeet and performing in this position, the metatarsals are subjected to a lot of stress. The second metatarsal is the most commonly injured area, especially in patients who have a short first metatarsal. There are increased weight demands upon the longer bone. All the metatarsal head areas are subject to irritation from the repetitive striking of the forefoot against the floor.

Treatment: Place a metatarsal pad on the foot or in the shoe. Consider providing the dancer with a dance orthotic that offers accommodative metatarsal support and extended forefoot cushion.

Treating Shin Splints

3. **Shin splints.** Landing on hard floors can cause irritation of the leg bones and the interosseous membrane. This is exemplified during frequent routines in which the dancer jumps with the hips in external rotation and lands on the balls of the forefoot. In this position, it is easier for the dancer to excessively pronate, which causes the inverter muscles to strain as they try to hold up the arch. As the arch collapses, these muscles may, in fact, pull from their origin on the tibia, leading to a stress fracture.

In order to prevent injury, it is imperative to align the knee directly over the foot in turn out position. However, the less accomplished dancer has a tendency to "cheat" in order to achieve a high degree of foot turn out. Unfortunately, when the dancer does this, his or her foot pronates in order to obtain increased toe out positioning. Once again, this action can lead to shin splint pains.

Treatment: Check that the dancer is

Fig. 3. The orthotic allows for increased flexibility and helps control pronation as well.

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and stable, limiting excessive subtalar and foot pronation. This can be observed in the dancer who has an immediate straightened knee alignment over the foot and an enhancement in hip turn out by a few degrees. Indeed, this device can lead to successful treatment of overuse ailments such as plantar fasciites/heel pain, shin splint pains and patella tendinitis.

The extended first metatarsal head cut out with varus posting of metatarsals two to five is commonly used with a semi or rigidly plantarflexed first metatarsal or in the cavus foot. The cut out accommodation can help increase first metatarsal joint motion and is also helpful to reduce excessive first metatarsal head pressure injuries such as sesamoiditis.

Counteract Frequent Lateral Ankle Pains

In addition, the extended forefoot correction is useful for dancers who frequently sprain their ankles and for those whose feet "sickle" (increased varus position of the rearfoot). By reducing this sickling/oversupination, this device helps to realign the foot and lower leg. It is also very helpful in treating overuse-related lateral foot and leg strains, including peroneal tendinitis and iliotibial band syndrome.

The device is unique in that it slips on to the bottom of the foot and is held in place by an elastic arch binder that is pre-sized to the dancer's in-step and arch. A soft "thong retention strap" is utilized between the first and second digits to prevent the device from moving proximally (see Fig. 4). This is very common in dance activity, which involves movements such as frappes — a move that

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pivoting routines off of one foot. Eventually, this contributes to overuse injuries.

What Causes Torsional Strains?

However, it doesn't stop there. Torsional strains can often develop from certain dance routines and are commonly exemplified in arabesque, attitude and grand battement movements. During these movements, the working leg is airborne in various positions while the supporting leg is on the floor. It must also be clarified that the foot of the supporting leg is usually in releve (up on the ball of the forefoot) or on pointe (on the tips of the toes). The movements of the dancer's working leg and entire body then act to increase rotational forces and shear stresses applied to the supporting leg and its joints.

Alignment Problems

The stresses and strains to the supporting leg are dramatically increased in individuals who have inherent podiatric structural malalignment problems or inadequate muscle balance. This may include dancers with poor hip turn out, knock knees, bow legs, internal rotation of the knees, leg length difference, excessively pronated feet, excessively supinated (sickled) feet, abnormal bony alignment of the forefoot to the rearfoot and extreme flexibility.

The total body instability — which stems from the difficult one legged-ball of foot position in dance and is exaggerated by these structural conditions — can be seen in many dancers who strive for balance when in releve, demi-pointe or on pointe positions. Here, their legs and body are noted to shake (quiver) and twist back and forth. It is no wonder that pain to the ligaments, muscles and tendons, which cross the hip, knee, ankle and foot joints, is so common under these circumstances.

These pressures, strains and alignment problems outlined above will likely manifest themselves in five common injuries that affect ballet dancers. Podiatrists should keep an eye out for these kind of injuries and consider the accompanying treatment options.

Five Ballet-Related Injuries

1. Sesamoiditis. The majority of experienced ballet dancers have a high arched foot type that inherently has an increased metatarsal declination angle. Hence, the sesamoid bones are more prominent plantarly. Many dance movements involve slapping the forefoot against the floor. Most

Can The Braver Ballet Orthotic Provide Treatment Relief?

In order to alleviate or prevent the debilitating impairments of pressure and instability commonly seen in ballet dancers, you may want to check out the Braver Ballet Orthotic, a device that I developed and have been using with success. Please note that I do have a proprietary interest in this device.

Biomechanically, the Braver Ballet Orthotic helps prevent and minimize torsional injuries of the foot and leg through an "extended forefoot correction." (see Fig. 1.) The corrections most commonly prescribed by podiatrists are a varus posting of three to five degrees or an extended first metatarsal head cut out with metatarsals two to five posted in three to five degrees of varus. The sulcus length forefoot extension can also be accommodated with extra shock absorbing materials — as well as with depressions or metatarsal raises — to resolve the pains of dropped, elongated or stress fractured metatarsals (see Fig. 2).

Fig. 1. Note the extended forefoot varus wedge of the Braver Ballet Orthotic.

Fig. 2. Correct positioning and extra shock absorbing materials can help provide relief.

Increase The Stability Of The Weaker Foot

When the dancer is up on the ball of the foot, the extended forefoot varus wedge correction helps to supinate or lock the forefoot. This ideally helps make a weaker or flatter foot more rigid

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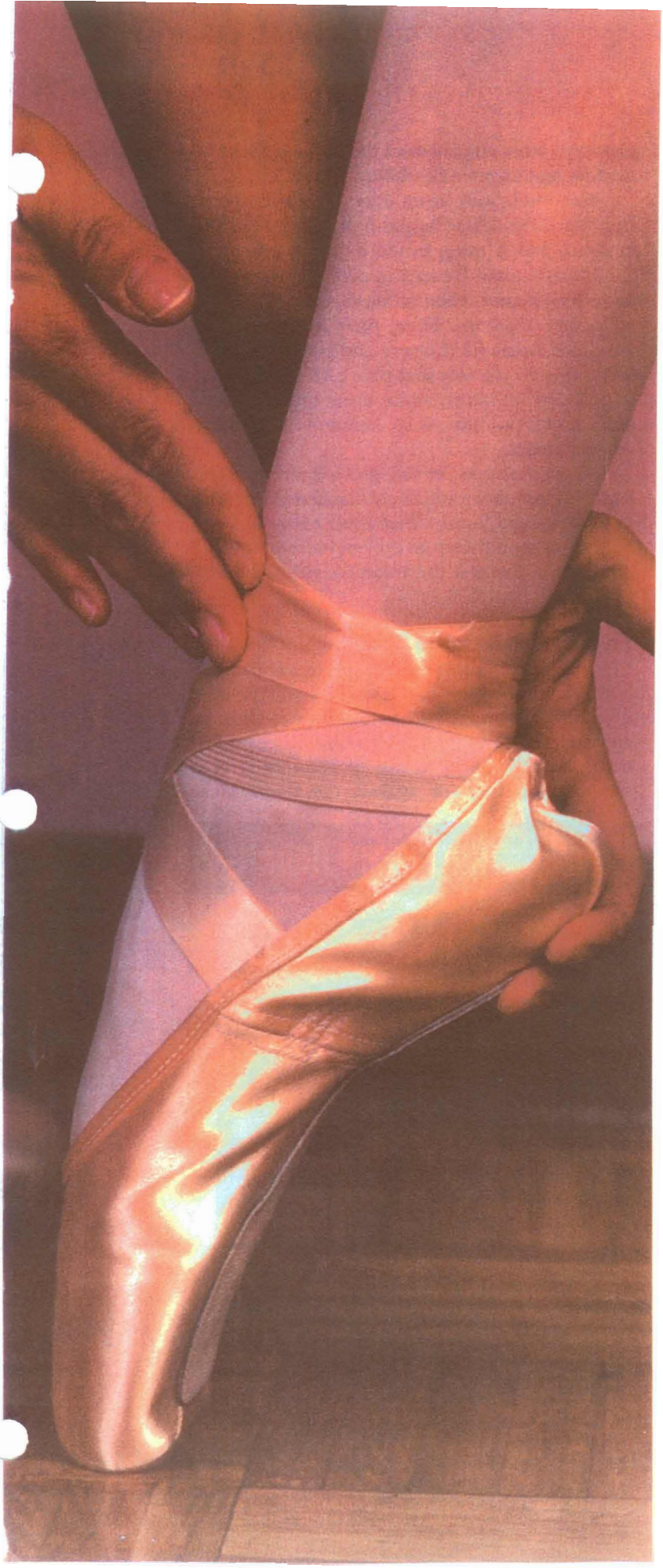

Insights On Orthotic Treatment Of Ballet Injuries

An oft-neglected avenue of sports medicine, ballet can be demanding on the feet and quite challenging for podiatrists. This author shares his experience and treatment strategies.

By Richard T. Braver, DPM

Where do ballet dancers spend a majority of their time? On their forefeet. Whether it's during dance class or rehearsal, they're always subjecting their feet and legs to excessive pressures and torsional (rotational) strains, which often lead to chronic injury.

In the frequently performed ballet positions of demi-pointe and releve, in which the dancer is up on the ball of his or her foot, the amount of pressure applied to the forefoot is much greater than when the foot is flat on the ground. This is due to the forward shift in body weight and is intensified because the heel and part of the sole are not participating in weight bearing.

The pressure to the forefoot is increased even more during jumping, landing and different