Influence of Podiatry on Orthopedic Surgery at a Level I Trauma Center

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Abstract

Level I trauma centers frequently see trauma at or below the ankle, which requires consultation with the orthopedic surgery department. However, as podiatry programs begin to firmly establish themselves in more Level I trauma centers, their consultations increase, ultimately taking those once seen by orthopedic surgery. A review of the literature demonstrates that this paradigm shift has yet to be discussed. The purpose of this study was to determine how many, if any, lower extremity fracture consultations a newly developed podiatry program would take from the orthopedic surgery department. A retrospective review was performed of emergency department records from January 2007 to December 2011. Seventeen different emergency department diagnoses were used to search the database. Ultimately, each patient’s emergency department course was researched. Several trends were noted. First, if trauma surgery was involved, only the orthopedic surgery department was consulted for any injuries at or below the ankle. Second, the emergency department tended to consult the podiatry program only between the hours of 8 AM and 6 PM. Third, as the podiatry program became more established, their number of consultations increased yearly, and, coincidentally, the orthopedic surgery department’s consultations decreased. Finally, high-energy traumas involved only the orthopedic surgery department. Whether the orthopedic surgery department or podiatry program is consulted regarding trauma surgery is likely hospital dependent.
Level I trauma centers frequently evaluate injuries that occur at or below the ankle, and many of these require surgical intervention. Traditionally, these injuries were treated by orthopedic surgeons; however, this appears to be changing. Podiatry is now an established alternative for even the most complex foot and ankle injuries. As staff privileges expand to include podiatric physicians at Level I trauma centers, more orthopedic surgeons find the number of emergency department consultations for foot and ankle injuries decreasing, a phenomenon that may also have an effect on orthopedic resident training in these centers. Several studies have addressed the orthopedic and podiatric dynamic regarding treatment, training, and effect of competition on case volume.\(^1\)\(^-\)\(^7\) However, a thorough review of the existing literature demonstrates that this paradigm shift has yet to be fully addressed in terms of its potential effects on the training of orthopedic residents. The purpose of the current study was to determine the effect, if any, that a newly developed podiatric program would have on the exposure of orthopedic residents to foot and ankle pathology in a Level I trauma center by taking patient consultations in the emergency department.

**Materials and Methods**

A retrospective review was performed of Level I trauma center emergency department records from January 2007 to December 2011. This time frame coincided with the establishment of a podiatric surgery residency program based at the same institution. This program was started in 2004, initially with 3 residents per class. In 2011, the program expanded its incoming class to 5 residents. Using the database that documents each patient encounter in the ER, a patient cohort was generated using 17 different International Classification of Diseases, Ninth Revision (ICD-9) codes, listing each patient with an injury at or below the level of the ankle (Table 1). The ICD-9 codes included fractures and significant ligamentous or tendinous injuries seen most frequently in the emergency department. For each of the patients identified, the specific injury, the surgical service that was consulted, the time of day the consult was called, and whether the pathology was ultimately operated on were documented. The results were separated based on the year of occurrence of the injury to allow for trend analysis.

Once all data were gathered, they were compared with all operative foot and ankle cases in the orthopedic surgery department during the same time frame. Using the department’s billing codes, data mining determined pathology for each patient. Operative cases included all emergency department referrals and inpatient and outpatient cases during the same 5-year period (2007 to 2011). The results were then separated by year to allow for trend analysis.

**RESULTS**

A total of 316 patients met the inclusion criteria. Average patient age was 46 years. There were 196 females and 120 males. The orthopedic surgery department was consulted on 205 (65%) patients, and the podiatry program was consulted on 111 (35%). Over the 5 years since the introduction of a podiatry residency, their share of consultations steadily increased from 5/55 (9%) to 16/53 (30%), 23/73 (32%), 26/64 (41%), and 41/71 (58%), respectively (Figure). The orthopedic surgery department saw all 23 cases that included a surgical trauma consultation. Eleven fractures with higher-energy mechanisms (ie, pilon fractures, ankle fracture/dislocations, tibial plafond fractures) were also referred to the orthopedic surgery department. A total of 29 patients were admitted. Among those admitted to the hospital, the orthopedic

**Table 1**

<table>
<thead>
<tr>
<th>Diagnoses Reviewed</th>
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<tbody>
<tr>
<td>Fracture of metatarsal bones</td>
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<tr>
<td>Fracture of foot phalanges</td>
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<tr>
<td>Fracture of the navicular</td>
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<tr>
<td>Fracture of the cuboid</td>
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<tr>
<td>Fracture of a cuneiform</td>
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<tr>
<td>Dislocation of metatarsal bone</td>
</tr>
<tr>
<td>Lisfranc injury</td>
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<tr>
<td>Midfoot dislocation</td>
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<tr>
<td>Fracture of the calcaneus</td>
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<tr>
<td>Fracture of the talus</td>
</tr>
<tr>
<td>Subtalar joint dislocation</td>
</tr>
<tr>
<td>Tibial plafond/pilon fracture</td>
</tr>
<tr>
<td>Fracture of the ankle (isolated malleolus, bimalleolar, bimalleolar equivalent, or trimalleolar)</td>
</tr>
<tr>
<td>Achilles tendon rupture</td>
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</tbody>
</table>

**Figure:** Breakdown of consultations between departments.
The surgery department was consulted for 26 patients, 18 of whom underwent surgery either during that admission or at a later date on an outpatient basis. The podiatry program was consulted on 3 patients who were admitted to the hospital, 2 of whom were operated on by podiatry staff.

The podiatry program was not in the hospital between the hours of 6 PM and 8 AM; thus, they were not consulted to examine patients between these hours. However, patients were occasionally instructed to follow up with them. This number increased from 0 in 2007 to 1 in 2008, 1 in 2009, 7 in 2010, and 14 in 2011.

Only 61 (19%) patients sustained injuries ultimately requiring surgical intervention. The orthopedic surgery department managed 43 of these patients. Eight patients were transferred to a pediatric hospital for surgical management. Seventeen patients were operated on by the podiatry program. Table 2 shows the breakdown of surgical cases per specialty. Eight of the fractures were open, and all of them were managed by the orthopedic surgery department.

The orthopedic surgery department was consulted on 14 of 17 patients younger than 18 years, with only 3 requiring surgery. Two of these pediatric patients (aged 17 years and skeletally mature) underwent open reduction and internal fixation (ORIF) for ankle fractures while admitted to the surgical trauma department. One pediatric patient (aged 12 years) was ultimately transferred to a pediatric hospital for ORIF of an ankle fracture. The orthopedic surgery department was consulted on 18 (67%) of 27 patients aged 65 years and older (Medicare population). Nine of these patients required surgical intervention, 7 by the orthopedic surgery department and 2 by the podiatry program.

In 2007, the orthopedic surgery department operated on 11 (92%) patients and the podiatry program operated on 1 (8%). In 2008, the orthopedic surgery department operated on 7 (64%) patients and the podiatry program operated on 4 (46%).

In 2009, the orthopedic surgery program operated on 9 (75%) patients and the podiatry program operated on 3 (25%). In 2010, the orthopedic surgery department operated on 6 (75%) patients and the podiatry program operated on 2 (25%). In 2011, the orthopedic surgery department operated on 10 (59%) patients and the podiatry program operated on 7 (41%).

Few patterns were seen among patients taken to the operating room, but the steady decline in metatarsal fractures (including fifth metatarsal fractures) consulted on by the orthopedic surgery department was apparent. While the podiatry program operated on more per year (1, 3, 3, 2, and 1, respectively, from 2007 to 2011), the orthopedic surgery department operated on fewer per year (7, 4, 3, 0, and 1, respectively, from 2007 to 2011).

In reviewing the department of orthopedic surgery’s coding data between 2007 and 2011, a total of 451 patients were seen as either outpatient for follow-up or as inpatient consultations. All 451 patients had pathology that was included in the 17 ICD-9 codes previously searched; 156 patients underwent operative intervention and 295 were treated nonoperatively. The number of operative foot and ankle cases over the past 5 years showed a significant decrease ($P=0.029$). The majority of this decrease involved less complex fracture patterns, including bimalleolar fractures and bimalleolar equivalents. Table 3 details the operative vs nonoperative foot and ankle case load pattern during the specified time frame.

## Discussion

This study documents a trend that may potentially have adverse effects on the training of orthopedic surgery residents: the emergence of a podiatry program that...
competes with the orthopedic surgery department in a Level I trauma center. Over a period of 5 years, the number of foot and ankle consultations by the orthopedic surgery department declined 49%, from 91% during the first year that the podiatry program evaluated patients in the emergency department to 42% after 4 years of podiatry program presence. In addition, 17 (28%) of 60 operative foot and ankle cases that were the direct result of emergency department admissions were performed by the podiatry program instead of the orthopedic surgery department. This decrease in foot and ankle case evaluations by the orthopedic surgery department occurred despite the fact that podiatric resident coverage was present only during the hours of 8 AM to 6 PM.

Sharing a surgical niche has been a challenge for some subspecialties in orthopedic surgery, not just foot and ankle. Sarmiento discussed the unrestrained growth of subspecialties in orthopedics, noting the possibility for “other surgical and medical disciplines to erode the orthopedic territory as they perceived that orthopedics was no longer an eclectic body of knowledge but rather splintered groups with a territory consisting of one or several operations.” He noted that within a short period of time, areas traditionally the purview of the orthopedist became either partially or completely the possession of other disciplines: spine by neurosurgery; hand and wrist fractures by plastic surgery; and foot, ankle, and leg problems by podiatry. He also observed that this growth in the number of subspecialties caused an evolution in residency programs, forcing training programs to change their structure to accommodate the new “superspecialized” faculty members. Because defined blocks of time were now allocated to several subspecialties, some rotations became too short to satisfy a resident’s needs.

The competition between orthopedic surgery departments and podiatry programs in particular has been addressed by other observers. Klenerman summarized the establishment of podiatry (or chiropody, as it was originally known) in an editorial in 1991. He noticed the “creeping substitution” of cases and hypothesized the orthopedic surgeon’s commitment to other regions of the body, the increasing complexity of foot surgery, and the lack of orthopedic interest to be the driving forces behind the transformation of podiatrists from practitioners that concentrated on office-based soft tissue problems to those performing any and all surgeries distal to the tibial tubercle. He called for a renewed enthusiasm from orthopedic surgeons to step up the waning commitment to surgical problems of the foot and ankle. Further causing concern regarding a decrease in foot and ankle experience in orthopedic surgery, the results of a questionnaire sent to all graduating orthopedic surgery residents in 1998 asking them to rate the adequacy of their training suggested that foot and ankle was a weak area in their education. The graduating residents rated the areas of their training on a 5-point scale, with 1 equal to superior, 2 equal to above average, 3 equal to average, 4 equal to below average, and 5 equal to inadequate. Foot and ankle received a 2.7, the worst of all rated subspecialty areas.

A decade later, another group of surveys, given first in 2003 then again in 2008, suggested that some improvements had been made in increasing orthopedic surgery residency foot and ankle exposure. These 2 successive surveys of 150 Accreditation Council for Graduate Medical Education (ACGME)-accredited orthopedic residency training programs showed that, by 2008, 91% of the programs had at least one faculty member with a predominantly foot and ankle-based practice (at least 50% of their case volume), an increase of 5.5% from the 2003 survey. In addition, 80% of accredited programs had a dedicated foot and ankle rotation, an increase of 15% from the prior survey. The number of residents who seek a fellowship in foot and ankle has steadily increased as well. In the 2013 match for 2014-2015 fellowship positions, a total of 62 positions are being offered by 38 fellowship programs. Seven of the programs are ACGME accredited. This is an increase from 2012, when 37 programs offered 58 positions. A total of 66 of the 640 graduating residents applied for those 58 positions, so numbers are slowly rising.

The trend reported here suggests that orthopedic surgery residency training, at least in some institutions, may be at risk of losing some of the gains made in the prior decade regarding foot and ankle exposure. In the short time period of this study, an incremental decrease was noted in the number of cases encountered by orthopedic residents in the emergency department and the number of cases performed on foot and ankle pathology. The authors’ concern is not for meeting the minimum requirements for adequate foot and ankle surgery as outlined in the ACGME guidelines, which require a small number of cases (15 ankle fracture fixations for graduation). With foot and ankle exposure on several different rotations, including a 3-month block at an affiliated institution with 3 subspecialty foot and ankle surgeons, the residents at the authors’ institution receive sufficient training. However, with constant changes in affiliations and staff, the surrendering of an increasing number of foot and ankle consultations to a competing service could potentially be a detriment under different circumstances. One of the purposes of this study was to alert other orthopedic surgery training centers to the possibility of competition with podiatry influencing the orthopedic surgery residents’ experience. From a broader perspective, this reported trend raises the question of whether competition with podiatrists also affects the livelihood of orthopedic surgeons who practice in the same community. In one published report, 40% of orthopedic surgeons believed that referral rates were influenced negatively
by the presence of a podiatrist in their community.12

The current study has some limitations. This analysis is only as accurate as the records kept by the emergency department database. It is possible that fractures or other injuries of the foot and ankle were coded incorrectly or missed when patients were admitted for other diagnosis codes. The analysis of surgical volume is somewhat at the mercy of possible variations in surgical indications between specialties and individual surgeons. The same inaccuracies may exist in the orthopedic surgery department’s billing codes and the variations between pathology based on billing codes and medical records.

This study suggests that there is competition for patients with foot and ankle trauma pathology and, in turn, orthopedic residents are seeing fewer surgical cases, which ultimately affects their education. Currently this is not threatening the ACGME requirements, but few would feel comfortable with any surgical procedure if only the minimal requirement were met. If this trend continues, orthopedic residency programs could see their expertise in foot and ankle pathology decrease. It is important to remember that the more referrals the podiatry department receives, the more pathologies that those patients may have outside the scope of trauma are lost. It is the responsibility of the orthopedic field to decide if it wishes to relinquish its role as a provider for all of the musculoskeletal system or if it is comfortable with its decreasing referral base.

CONCLUSION

As a podiatry program established itself in a Level I trauma center, orthopedic surgery department consultations decreased regarding foot and ankle trauma. The decrease in consultations may ultimately affect orthopedic residency education in foot and ankle pathology. Whether orthopedic surgery or podiatry is consulted regarding trauma surgery is likely hospital dependent.

REFERENCES