

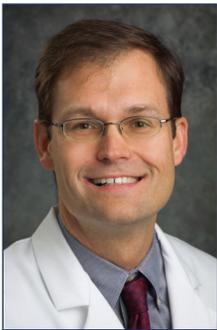


Resident REVIEW

CUTTING EDGE ORTHOPAEDIC INFORMATION ENHANCING RESIDENT EDUCATION

August 2011

From the Editor, Steven L. Frick, MD



I am honored to take over the editorship of the POSNA Resident Review from Ken Noonan, MD, one of the most respected educators in pediatric orthopaedics. Ken did a great job getting

the Resident Review started, and we will try to continue to provide you with content reviewing pediatric orthopaedic topics, and also point out current events and issues relevant to pediatric orthopaedics. We will keep the format similar to past editions, with a clinical focus topic, an interview of a prominent, accomplished pediatric orthopaedic surgeon, clinically challenging case presentations with OITE-like questions, and current events updates.

One challenge for orthopaedic associations is to provide surgeons who want to contribute with opportunities to do so. POSNA asks for your help in the next year reviewing the core curriculum for pediatric orthopaedic surgery in residency programs. The current curriculum is called the Pediatric Orthopaedic Study Guide, and you can find it on our website at <http://www.posna.org/education/StudyGuide/index.asp>. For those of you interested in a career involving teaching and academics, this is an

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Clinical Focus Topic: Nonaccidental Trauma

By: Ron El-Hawary, MD, MSc, FRCS(C)

Nonaccidental trauma, or child abuse, is an unfortunate reality for some children. It is essential that orthopaedic surgeons are able to recognize nonaccidental trauma in order to prevent further morbidity, or even mortality, to victims of abuse. The incidence of nonaccidental trauma varies from region to region, ranging from 0.47 per 100,000 to 2000 per 100,000 children. In some reports, abuse is the responsible etiology for 12% of all children who are hospitalized for fracture. Orthopaedic surgeons should have the skills to identify nonaccidental trauma by obtaining a detailed history, performing a thorough physical examination, obtaining appropriate imaging studies, and ensuring a multi-disciplinary approach to the care of the patient.

Surgeons should be aware that several patient, family, and societal risk factors for nonaccidental trauma have been identified. Important patient factors include a history of prematurity, associated medical conditions, and young age. Abuse can occur at any age; however, 80% of all fractures related to abuse occur in children less than 18 months of age. The typical profile of the perpetrator is that of a young, female who is the primary caregiver of the child. Other risk fac-

tors are a history of difficulty coping with stressful situations, a history of abuse as a child themselves, and having weak parental feelings for their child. Low socioeconomic status and a lack of community support have also been implicated. Despite studies supporting these profiles, nonaccidental trauma is known to also occur without any of these risk factors.

When evaluating children with fractures, consideration should always be given to the possibility of nonaccidental trauma. Fractures are present in approximately one-third of abused patients; however, with one exception the fracture pattern or location is not considered pathognomonic for nonaccidental injury. The exception is the presence of "bucket-handle" or metaphyseal corner fractures in infants, as the mechanism of injury for this fracture involves longitudinal traction and torsion applied to the limb by an external force. Particularly suspicious fractures are posterior rib fractures, femoral shaft fractures in children less than one year old (Fig.1), humeral shaft fractures in children less than three years old, and hand or foot fractures in children prior to walking age.

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Clinical Focus Topic: Nonaccidental Trauma

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Figure 1. Femoral shaft fracture in 3 month old, secondary to NAT.

As 74% of abused children have been found to have two or more fractures present, skeletal survey radiographs should be obtained for all patients in whom there is a question of nonaccidental trauma. These radiographs may also identify fractures at different stages of healing which should also raise the suspicion of child abuse. If the skeletal survey is negative and there is still suspicion for abuse, either a bone scan (Fig 2) or repeat radiographs a few weeks later can be useful. When considering non-accidental trauma as the cause of a fracture, it is important to keep in mind the differential diagnosis, which may include accidental trauma, birth trauma, Osteogenesis Imperfecta, Caffey Disease, or rickets.



Figure 2. Bone scan showing right side ribs fractures in addition to left humerus fracture.

Careful and non-accusatory discussions with the patient's caregivers are essential for the surgeon in considering the diagnosis of child abuse. Social workers and Child Protection Teams should be contacted to assist with making the diagnosis, and particularly to ensure the safety of the abused child after discharge. If there is suspicion for head injury, neurosurgery and ophthalmology, should be consulted, as a multidisciplinary approach is key to ensuring that all of the patient's injuries are appropriately diagnosed and treated. Although sometimes challenging, making an accurate diagnosis of nonaccidental trauma allows the abused child to be protected from further injury or even death.

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Practice Management for Graduating Residents and Fellows: How Can You Be Most Successful?

An Interview with Dr. James Roach

By: Henry J. Iwinski, Jr., MD



James W. Roach, MD, MBA

James W. Roach, MD, MBA is Professor of Orthopaedic Surgery at the University of Pittsburgh, and the director of the Pediatric Orthopaedic Fellowship at the University of Pittsburgh. Dr. Roach has maintained a significant clinical activity with focus on pathologies of the child's hip and pediatric spinal deformity, and has developed the new satellite pediatric subspecialty clinic and outpatient surgical center at the Erie Shrine Facility. He is the immediate Past President of POSNA. During his presidential year, he focused much effort on improving practice management resources for our members. In the interview below, he shares some of his thoughts on practice management, and gives practice development and career advice for young orthopaedic surgeons.

A successful orthopaedic practice, whether private, employed, or academic, has many parts, all of which must fit together and function efficiently to create a harmonious work place. Some of these issues may appear to be mostly applicable to private practice, but physicians in all work settings should understand the economics of an orthopaedic practice.

What do residents need to consider first if they are considering private practice?

They need to know that starting up

a practice can be difficult and time consuming. First I would recommend they identify a CPA that specializes in these services. They will identify which payors will be most economically advantageous to the practice. The CPA will also discourage participation in plans that require excessive discounts in orthopaedic fees. Because the cost of the CPA's services will typically be a percent of collections, incentives are aligned for both parties. It takes time to get on the plans, so identify a CPA you can trust and start the process of joining the insurance plans early.

Residents get very little training in proper coding during their residencies. Coding workshops held by practice management companies such as Karen Zupko and Associates (3) are very informative. The workshops are intended to provide an understanding of the complete revenue cycle, not just the coding/billing portion but accounts receivable, deductibles, co-payments, appeals, and compliance issues as well. Understanding how a partner's mistakes with coding might create liability for the entire group is important.

Residents should read both The International Classification of Diseases, 9th Revision (ICD-9) produced by the National Center for Health Statistics (NCHS) and the Centers for Medicare & Medicaid Services (CMS), and Current Procedural Terminology 4th edition (CPT) produced by the American Medical Association. (1, 2) These books describe the diagnosis codes (ICD-9) and procedural coding (CPT) necessary to receive reimbursements. Accurate coding, including modifiers and consultation codes, decreases the time to reimbursement. Creating a laminated summary of the most commonly used codes is helpful in the clinic and the operating room.

Where should they consider setting up their office?

So much of the patient experience occurs prior to seeing the physician. Poor office location makes a negative statement to patients. The office should be in a patient-friendly location with adequate parking. Proximity to your hospital or even within the grounds of the hospital can save hours in the daily routine. All rooms should be usable as cast rooms. Hallways should be sufficiently wide to allow observation of the patients while they walk. Do not over-lease the square footage, but be sure there is adequate room for radiology, possibly ultrasound, and mini C-arm (if the office is to treat pediatric fractures). These ancillaries are sources of revenue, which are very important to a financially secure office.

What personnel are needed to run an office?

Office management philosophy establishes the tone of the practice and can either be very helpful or hurtful. Non-physician family members, especially spouses, should not work in the office. Practice management company experience shows that this causes excessive turnover of office personnel and can be a hindrance when a new partner is being recruited.

- **Front Office Activities** – These consist of registration, appointment scheduling, and co-pay collections. These functions should be provided in quiet areas and in a non-hurried fashion.
- **Clinical Activities** – Medical assistants (MAs) can double as cast and radiology technicians. In most states MAs can be trained to take radiographs of everything except the spine and pelvis, which must be taken by a certi-

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fied radiology technician (CRT); so an MA can fill in for a CRT. Some redundancy of personnel is necessary to keep the clinic work flowing, but still allow identification of call-in problems that need solutions. Typically, one MA is assigned telephone triage each day.

- **Back Office Activities** – These include maintaining charts or the electronic medical records (EMR), developing letters to referring physicians, and providing prompt supporting letters for billing service appeal of payor rejections. Usually one administrative person for every two to three physicians is adequate.
- **Office Philosophy** – Clinic personnel reflect the attitudes that they see in the staff physician. If the physician is abrupt and gruff with them, they in turn will be curt to the patients. Physicians should always consider how their demeanor will affect their staff. Orthopaedic practices essentially work for their referring physicians. The orthopaedic surgeon and the office staff must understand this concept, and not view the extra patient as a burden. The staff will react to that patient in a subtle but negative way.

What about malpractice insurance? What should residents know?

The best plans are often available through the state medical association. Physicians must understand the difference between “claims made” versus “occurrence” policies. Claims made policies only cover events if the policy is active at the time the suit is filed. Occurrence policies cover any event that happened during the time the policy was in effect. Changing a claims made malpractice insurance policy requires purchasing tail coverage to protect the physician from previous events. Tail coverage for “claims made” policies can be very expensive, often 100K or more. Oc-

currence policies are best but the premiums are more expensive.

How does one decide whether to bring in another partner?

When things are going really well you may want to add a partner. Do you look for a physician partner or a midlevel provider? This depends on anticipated future cash flow, and whether there is an unfulfilled surgical need versus more office work. Extra clinic work is best handled by adding a midlevel provider, such as a nurse practitioner or physician assistant. Unfulfilled surgical needs are best handled by bring in a new orthopaedic surgeon.

If residents are considering an academic practice or being hired by a hospital, do they need to think about these issues?

Employed physicians may believe they shouldn't be concerned with the previous issues. This is a dangerous assumption. In reality, these physicians should pay a great deal of attention to business issues. The employed physician should not assume that the people assigned to provide payor contracting, billing, and collecting are truly incentivized to help. Many do the same work for the hospital and this leads to a conflict of interest that should be considered. A hospital contracting department may negotiate lower orthopaedic payments to enhance better rates for other specialists or the hospital itself, and because no one truly represents the individual orthopaedic surgeon, he or she will not know this has happened. Physician billing and collection monitoring provided through a hospital department also competes for time and attention with the hospital collections, and because the dollars involved on the hospital side are so much bigger, the effort is mostly spent on the hospital's collections.

What should they look for in a contract?

Physician employment contracts should be clearly written. They should be read carefully to assure the assumptions about the physician/employer relationship are well defined. Read each clause and after reading it, pose a question to yourself; “Will this likely happen?” if so “How will this happen?” and finally “Who needs to be incented to help me make this happen?” Once you have confidence that you understand the how and why of the performance part of the contract, read it again assuming that things have gone wrong and you need out of the practice. Are there financial claw-back clauses, non-compete clauses with geographic restrictions and temporal waiting periods, tortious interference clauses which would preclude hiring your current staff into your new practice, and finally, do you have any claim to your accounts receivables after you leave? It is important to consider each of these issues before you sign and negotiate each as needed with the help of an attorney.

Nevertheless, many of these issues can be addressed with a well written employment contract. “The Contract” should make it evident who is incented to work on your behalf and each of the following should be addressed in it:

- **How are you paid?** If it is based on net collections, practice expenses will affect your salary and you should therefore have control over expenses. These costs include office overhead such as rent, the skill sets and thus salaries of office personnel (registered nurses versus medical assistants), malpractice insurance, and so forth.
- **Who contracts, bills, and collects for you? Are they truly incented to work for you?** If the hospital billing department

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An Interview with Dr. James Roach, *continued*

provides your billing, does your contract specify a minimum collection rate for claims that were initially rejected? Rejected claims require substantial effort to collect and are a good measure of how hard the billing service is working for you.

- **Can you negotiate a relative value unit (RVU) based salary?** If so, this will remove the expenses side of the equation and you will receive some reimbursement for all the work performed. The rate of reimbursement in the RVU model is often less than the amount paid by commercial insurance but in settings of high rates of uninsured or under-insured patients, a RVU system can help offset these losses.
- **Will you receive revenue credit for the office x-ray machine, ultrasound, and mini C-arm?** These are a major portion of expected revenue in private office settings. If not, you can ask for offset credit in your reimbursement. Hospitals and occasionally academic practices will sometimes compare your collections to practices where these ancillaries are included. Your economic performance will be 1/3 lower in that instance and you must be aware of this to avoid being penalized by the comparison.
- **Tail coverage should be provided by the employer.** Again this can run above 100K based on the length of time you were practicing. Remember the average orthopaedic surgeon moves two or three times during his or her career.

Are there other non-practice related concerns? What other issues do orthopaedists need to consider when they are starting up?

Both life and disability insurance should be acquired early and should be personal policies, not group policies. Whole life policies develop cash

value and can be thought of as equivalents to bonds. These are cheaper when the insured is young and the premiums will not increase over time. After a number of years (around fifteen) the annual dividends are usually sufficient to pay the premiums and the policies will not require further out of pocket payments. Term life policies are only death benefits and do not build cash value or pay dividends. These policies are very inexpensive initially but the premiums increase each year. People with term life policies plan to drop them in the future and rely on other investments to cover death benefits. Disability insurance should be individual coverage. Group plans are often lost if the physician changes practices or even moves out of state. Disability insurance should guarantee coverage for the physician's complete occupation, i.e. coverage as an orthopaedic surgeon not just as a physician.

An assistant should be assigned to monitor expiration dates of various documents. This includes state medical license, DEA certificate, malpractice insurance, association dues, and especially maintenance of certification (MOC) requirements for the orthopaedic surgery boards. All of these are important and the consequences of lapse can be extreme. MOC is an area that needs special attention as the timeline is long, the deadlines are strict, and the criteria are complex and evolving.

Young physicians should establish a financial plan early, preferably one with a fee-only planner. It is important to carefully adhere to the plan and meet frequently with the financial planner. Be very cautious in acquiring debt (house, car, boat, plane, or whatever). Investments with long timelines will provide options for the uncertain future. Buy things prudently and move up as your income and life situation evolve. The ups and downs of the economy can give you a chance of a lifetime to buy things like

a house if you have been prudent with your debt. At the same time excessive debt in a depressed economy is a prison that limits your ability to change your practice, your location, or even small things like your house. It is very difficult to recover from too much debt in a depressed economy.

What is it that leads to a happy, long-lasting and fulfilling practice?

Your non-physician co-workers have more control over your life than you may believe. Your personality is demonstrated to them every day and they will be quick to give their opinions about you to their friends. Let me give an example: the slippery fiberglass center of a roll of cast material often "drops" on the OR floor as the cast is being applied. Because someone can easily slip on it, this center should never be purposefully dropped. However if it does fall and the physician involved does not eventually pick it up, another member of the OR staff will, probably annoying him or her. Never consider yourself above cleaning up a mess and show appreciation for those with whom you work. Everyone knows hospital personnel and potential patients frequently ask them about physicians. "Is Dr X a good person for me to see?" or "Dr X operated on me and I don't think the outcome was very good. What do you think?" The responses from these co-workers can be helpful or not, and which it is will often depend on your relationship with the questioned individual. Introduce yourself to hospital personnel; take time to learn about their lives and worries; clean up after yourself; thank them at the end of a case. They will appreciate your friendship and will be valuable supporters.

If things go poorly in the OR and you swear or throw something, you may think it shows your concern for your patient. However, the OR team will

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An Interview with Dr. James Roach, *continued from page five*

think you are insecure, inexperienced, and possibly incompetent. Don't do it. It never helps in any situation. In a crisis, your ability to remain calm gives everyone confidence and may be the biggest factor in a successful outcome for your patient.

Physically examine every patient, even if the diagnosis is seen on the radiographs. Patients understand the importance of the physical examination and conducting it provides assurance that you are a thoughtful and thorough physician. Try very hard to convert your especially difficult patients or parents into your most loyal supporters. The most difficult are also the quickest to give great comments when they are satisfied and people give more weight to recommendations from those known to be hard to please. Make a pre-op call to these "high maintenance" parents or patients who are undergoing high risk procedures. If complications occur, they will remember "the doc thought enough of our relationship that he or she called me before surgery."

Any final thoughts about a choosing a career in orthopaedics? Orthopaedic surgery is a stimulating specialty and an orthopaedic surgery career is one of the most rewarding in medicine. Even when times and cases are hard, always try to remember that it is a wonderful privilege to be able to provide orthopaedic care to patients. Approaching your career in a thoughtful way, with a cheerful and optimistic demeanor, helps those around you reflect much of the same spirit and will likely prolong your life.

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Pediatric Orthopaedic Fellowship Match Program

By: Scott J. Luhmann, MD

This year's pediatric orthopaedic fellowship Match was once again successful from the perspectives of both applicants and the fellowship programs. Fifty-six applicants submitted rank lists to the San Francisco Match Program (SFMP), vying for 65 positions available at the 40 registered North American fellowship programs. Forty-seven applicants were matched and 9 were not matched.

In April, just before Match Day, POSNA surveyed the applicant class about the match process. The applicants reported the mean number of applications submitted to fellowship programs was 11, with a mean of 5 interviews per applicant. Of the 43 responders, 100% reported there was no direct pressure to make a commitment prior to the Match Day. This survey was extremely valuable in assessing this year's Match and for improving the process for next year's match.

The 2012 Match process will start September 1, 2011, with the uniform application becoming available on the SFMP's website (for fellowship positions starting 2013). Applicants will need to complete the application and send back to the SFMP, with the supporting documents listed on the website. The goal is to have all applications in to the SFMP by October 1st to optimize interview scheduling. As in 2011, the interview process will begin at an earlier date (November 15th). This will permit interviews to be conducted at the IPOS and AAOS meetings, and allow interviews to be spread out over a greater time period. Ideally this will create less scheduling problems in residency programs, with a lower financial burden. Applicants are encouraged to arrange formal visits to the fellowship program site, and to view the IPOS and AAOS meetings as an "informal" opportunity to meet

with fellowship directors attending those meetings. Applications may be submitted up to the end of the interview time period (March 31st), however "the early bird gets the worm". The SFMP will send out the application form (and supporting documents) to all programs the applicant lists on the website.

After interviews (November 15th - March 31st), match lists from the applicants and the fellowship programs are due on April 12th. One week later the match process will occur. Applicants will be notified by the SFMP of their assigned pediatric fellowship on Thursday, April 19, 2012. Immediately after the match notification, applicants who do not match will be able to use the SFMP website to identify fellowships which did not fill, and they can also contact the POSNA main office as necessary to get assistance. Post-match vacancies will be posted on the SFMP website on April 23, 2012.

A **new** policy for this year and for subsequent years has been adopted by pediatric orthopaedic fellowship directors - post-interview contact between applicants and fellowships will NOT be permitted. In past years, contact was permitted only if done by the applicant, to assist optimal decision-making by the applicant if additional information was needed. This change is in response to the most recent applicant survey and, to a lesser degree, to the Board of Orthopaedic Specialties Fellowship Match Oversight Committee recommendations for all subspecialty fellowships. By eliminating any contact after the interview, any inkling of coercion or pressure on the applicant about their rank list should be minimized.

Focus – Pediatric Neoplasms and Musculoskeletal Infections

Challenging Cases: What Would You Do?

CASE #1

A 12 year old boy presents to your office with a history of hearing a “pop” after jumping. Radiographs reveal a fracture through cystic lesion of the proximal femur (figure 1). Findings that may help differentiate an aneurysmal bone cyst from a unicameral bone cyst include:

- A. A small fragment of bone which has fallen to the bottom of the cyst
- B. Central location of the cyst
- C. Metaphyseal location of the cyst
- D. Fluid-fluid levels on an MRI
- E. None of the above

Your Response: _____

Figure 1



Discussion

Aneurysmal bone cysts (ABC) may be indistinguishable from simple cysts (UBC) radiographically. Multiple fluid-fluid levels on an MRI are suggestive of an ABC when compared to the unilocular appearance of a UBC. ABCs are usually metaphyseal, while UBCs can also be seen in the diaphysis as well. The “fallen leaf sign” which is a small fragment of bone which has “floated” to the bottom of a UBC, is pathognomonic for a UBC. ABCs are often eccentrically located in the bone. While these are general rules, often a differentiation between the two can only be made at the time of surgery. Since treatment is differently for the two lesions, a plan for differentiation is important prior to beginning treatment. This patient had a UBC treated percutaneously.

The correct answer is D.

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CASE #1, continued

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CASE #2

Treatment of Aneurysmal bone cysts is best accomplished with:

- A. Percutaneous curettage alone
- B. Serial corticosteroid injection
- C. Open grafting with/without adjuvant treatment
- D. Cannulated screw placement
- E. Percutaneous calcium phosphate injection

Your Response: _____

Discussion

Simple bone cysts have traditionally been treated in a multitude of ways, including injection of bone marrow aspirate, corticosteroids, bone graft substitute, or ethanol, by open grafting, or by puncture with a flexible rod or screw. These methods are not appropriate for ABCs, which have a higher rate of recurrence. Traditionally open grafting after removal of all membranes has been the treatment of choice. Due to the high rate of recurrence, adjuvant treatments such as burring of the cyst wall, use of liquid nitrogen, ethanol, or peroxide are often performed as well. Recently, embolization has also been considered. As with simple cysts, the treatment of ABCs varies by institution, and the surgeon should be familiar with multiple treatment options.

The correct answer is C.

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Challenging Cases: What Would You Do?

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CASE #3

A patient presents to your office complaining of lower extremity deformity (figure 2) Patients with this condition require surgical treatment for all of the following reasons except:

- A. Progressive deformity
- B. Pain in a lesion after skeletal maturity
- C. Cartilage cap larger than 2 millimeters
- D. Symptomatic lesion from soft tissue irritation
- E. Growth of the lesion after maturity

Your Response: ____



Figure 2

Discussion

Patients with multiple hereditary exostoses (MHE) often require surgery. Indications include symptoms from the lesions themselves (tissue irritation and pain, angular deformity) as well as findings suggestive of malignant transformation into a chondrosarcoma (growth and pain after maturity, cartilage cap on MRI greater than 2 centimeters). Treatment of solitary osteochondromas is similar.

The correct answer is C.

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CASE #4

A 17-year-old soccer player presents to the office during the season with activity-related bilateral anterior knee pain. An Xray reveals a lesion of the left distal femur as seen in figures below. Your next step is to:

- A. Order an MRI and proceed with excision of the lesion if the cartilage cap is larger than 2 millimeters.
- B. Counsel her that 50% of her children may have similar lesions.
- C. Obtain a pre-op MRI of the cervical, thoracic, and lumbar spine to rule out lesions within the spinal canal.
- D. Inform her of the lesion and offer surgical excision after the soccer season if the lesion grows or becomes symptomatic.
- E. Inform her that the likelihood of future malignant transformation of the lesion is approximately 10-15%.

Your Response: ____



Discussion

The Xray reveals a sessile bony lesion along the anterolateral edge of the distal femur. Based on the continuity of the medullary canal with the lesion and the lack of any aggressive bone reaction, the most likely diagnosis is an isolated osteochondroma. Because many lesions remain asymptomatic, the true incidence of osteochondromas remains unknown. Isolated osteochondromas (which can be sessile or pedunculated) are the most common benign lesions of bone, and the risk of malignant degeneration into chondrosarcoma is rare, estimated at less than 1%. Although the true risk of malignant degeneration is unknown, a large (greater than 2 cm) or rapidly growing cartilage cap increases the suspicion for malignancy. Contrary to isolated osteochondromas, the condition multiple osteochondromatosis or multiple hereditary exostosis (MHE) is autosomal dominant and has been associated with the EXT genes. Osteochondromas are most commonly found in the

Challenging Cases: What Would You Do?

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CASE #4, continued

appendicular skeleton; however, they can occur centrally, even within the spinal column. Patients with MHE and neurologic symptoms should have a spinal MRI to rule out such lesions. The girl in the question is having bilateral knee pain which is probably not due to the incidentally found isolated osteochondroma. Because she is skeletally mature, the lesion is unlikely to grow or become symptomatic. If surgical excision is elected, this could be delayed until after the soccer season.

The correct answer is D.

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CASE #5

Relative indications for treatment of nonossifying fibromas (fibrous cortical defects) include all of the following except:

- A. Pain with activity
- B. Displaced Fracture
- C. Tenuous location (i.e . femoral neck) where complications from fracture are significant
- D. Posterior location in the tibia
- E. Large lesion involving 80% of the bone width

Your Response: _____

Discussion

Non ossifying fibromas(NOF) are common lesions seen incidentally on radiographs. While these benign lesions are usually easily identified by their scalloped, well corticated appearance, occasionally they may be difficult to distinguish from other fibrous lesions. Predicting fracture risk based on size is difficult, particularly on plain radiographs, so size remains a relative indication. Several authors have attempted to quantify this risk using computed tomography. Often these are treated when a displaced fracture through the lesion requires operative fixation. A surgeon may choose to prophylactically treat a large lesion associated with pain, particularly if its location would lead to a difficult to treat fracture, such as in the femoral neck. The most common presentation is a small lesion in

CASE #5, continued

the posterior aspect of the tibia, so that would not be an indication to treat.

The correct answer is D.

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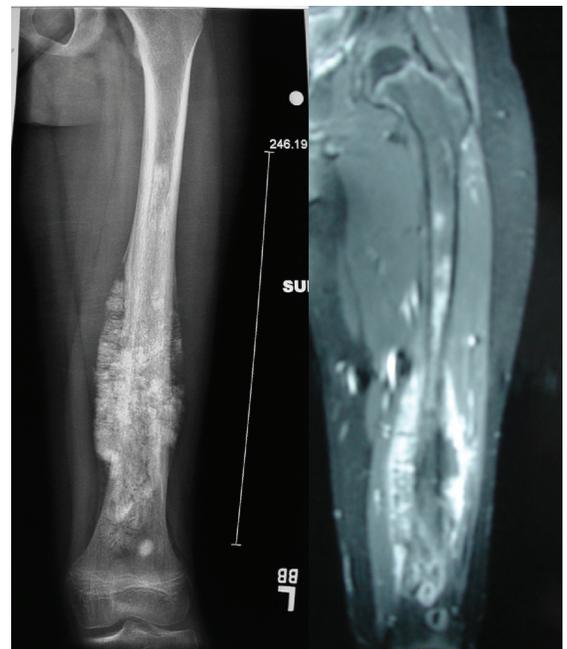
CASE #6

A 12 year old female presents with painful swelling of the left distal femur and knee. She has not had any constitutional complaints. Her WBC count is 7,000 without a left shift and her sedimentation rate is 32 mm/hr. Radiographs and MRI are presented here (Figure 2a and 2b). The most likely diagnosis is:

- A. Sarcomatous Degeneration of an Exostosis
- B. Diaphyseal Osteomyelitis
- C. Osteosarcoma
- D. Paget's Disease
- E. Sarcomatous Degeneration of an Enchondroma

Your Response: _____

Figure 2a and 2b



Continued on page 10

Challenging Cases: What Would You Do?

continued from page nine

CASE #6, continued

Discussion

The radiographs and MRI scan of this child with osteosarcoma show radiographic signs of new bone formation. Sunburst pattern from the diaphysis and periosteal elevation are consistent with an aggressive process. Endosteal bone formation and skip lesions are present. These findings are extremely suggestive for osteosarcoma. Although infection can mimic many processes, her inflammatory parameters are low for this level of involvement and no abscess is seen on MRI. Paget's diseases and sarcomatous degeneration of exostosis or enchondromas do not occur in children.

The correct answer is C.

References

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Eftekhari F. Imaging assessment of osteosarcoma in childhood and adolescence: diagnosis, staging, and evaluating response to chemotherapy. *Cancer Treat Res*. 2009;152:33-62.
Ilaslan H, Schils J, Nageotte W, Lietman SA, Sundaram M. Clinical presentation and imaging of bone and soft-tissue sarcomas. *Cleve Clin J Med*. 2010 Mar;77 Suppl 1:S2-7.

CASE #7

A 12 year old cross country runner has insidious onset of heel pain that makes it difficult to walk. She denies any symptoms of infection or previous trauma. Her exam demonstrates a swollen foot with tenderness over her heel, no sores or penetrating wounds are noted. Plain radiographs and an MRI were obtained (Figure 1a and 1b). The most likely diagnosis:

- A. Calcaneal Stress fracture
- B. Osteosarcoma
- C. Ewing's Sarcoma
- D. Osteomyelitis
- E. Eosinophilic Granuloma

Your Response: _____

Figure 1a



CASE #7, continued

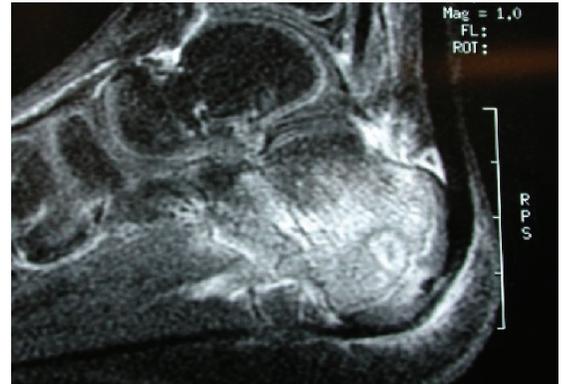


Figure 1b

Discussion

Plain films and radiographs demonstrate changes in the calcaneus adjacent to the apophyseal growth plate of calcaneus. This location is similar to the metaphysis of long bones and can be a location for hematogenous osteomyelitis. The most likely pathogen is staphylococcus aureus; less virulent organisms such as kingella kingae can also be seen here. Other neoplastic processes such as malignant sarcoma are extremely rare. Eosinophilic granuloma is possible, biopsy and cultures should be obtained to confirm diagnosis. The radiographs and MRI are not consistent for stress fracture.

The correct answer is D.

References

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Ishikawa SN. Conditions of the calcaneus in skeletally immature patients. *Foot Ankle Clin*. 2005 Sep;10(3):503-13.
Rasool MN. Hematogenous osteomyelitis of the calcaneus in children. *J Pediatr Orthop*. 2001 Nov-Dec;21(6):738-43.
Jaakkola J, Kehl D. Hematogenous calcaneal osteomyelitis in children. *J Pediatr Orthop*. 1999 Nov-Dec;19(6):699-704.

CASE #8

A 3 year old girl presents to the emergency department with a history of an upper respiratory infection with low fevers over the last week for which she is being treated with amoxicillin. Yesterday mom noted a limp and today she just won't walk. Which set of values is most consistent with septic arthritis of the hip?

- A. Temp 101.6, CRP 0.1, ESR 8, WBC 15,000,
- B. Temp 99.5, CRP 0.1, ESR 8, WBC 6,000
- C. Temp 99.5, CRP 0.1, ESR 15, WBC 15,000
- D. Temp 101.6, CRP 3.6, ESR 15, WBC 6,000
- E. Temp 99.5, CRP 3.6, ESR 15, WBC 6,000

Your Response: _____

Challenging Cases: What Would You Do?

continued from previous page

CASE #8, *continued*

Discussion

Clinical prediction algorithms for distinguishing septic arthritis of the hip from transient synovitis can aid in the identification and prompt treatment of septic arthritis. Most include the patient's temperature, laboratory tests including CRP, ESR, and white blood cell count, as well as clinical factors such as the refusal or inability to bear weight. Other elements to consider are the recent treatment with antibiotics, the actual presence of an effusion in the hip, and the cell count and differential from the effusion. The factors should be considered an adjunct to (not a replacement for) good clinical judgment.

The correct answer is D.

References

Kocher MS, Mandiga R, Zurakowski D, Barnewolt C, Kasser JR. Validation of a clinical prediction rule for the differentiation between septic arthritis and transient synovitis of the hip in children. *J Bone Joint Surg.* 2004;86-A:1629-35.
Caird MS, Flynn JM, Leung YL, Millman JE, D'Italia JG, Dormans JP. Factors distinguishing septic arthritis from transient synovitis of the hip in children: A prospective study. *J Bone Joint Surg.* 2006;88-A:1251-7.
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CASE #9

A 14 year old boy presents with a history of shin pain and clavicle pain and a slowly enlarging mass which he noted a few months ago. There is no history of fevers. Examination reveals a tender enlarged clavicle in the midshaft region. Radiographic studies are shown below in Fig 1.

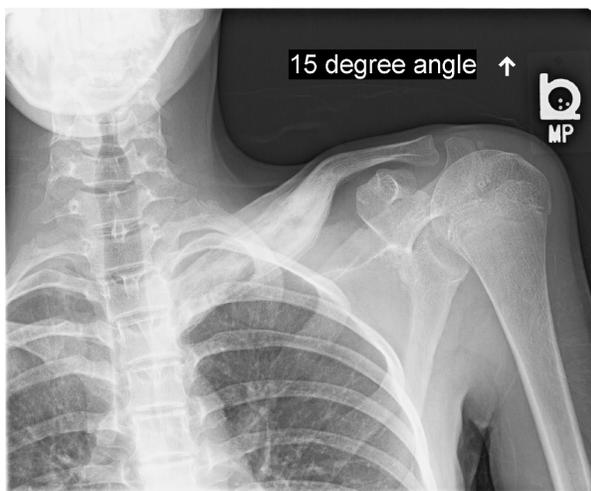


Fig. 1

CASE #9, *continued*

Treatment course likely should include:

- A. Anti-inflammatory medication
- B. IV vancomycin
- C. Open biopsy of the clavicle and antibiotics based on cultures
- D. Open biopsy of the clavicle with curettage and bone grafting
- E. Open biopsy of the clavicle with chemotherapy

Your Response: _____

Discussion

The view of the clavicle shows periostitis, the formation of layers of bone, and widening of the bone. The location and radiograph suggest chronic recurrent multifocal osteomyelitis (CRMO), which occurs in the long bones and the clavicle. The etiology is unknown, although an infectious cause or an autoimmune cause is suspected. Although one biopsy is often performed, the histology is consistent with inflammation and new bone formation without positive cultures.

The correct answer is A.

References

Abril JC, Ramirez A. Successful treatment of chronic recurrent multifocal osteomyelitis with indomethacin: a preliminary report of five cases. *J Pediatr Orthop* 2007;27:587-591.
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Jurik AG, Helmig L, Ternowitz T, Moller BN. Chronic recurrent multifocal osteomyelitis: A follow-up study. *J Pediatr Orthop* 1988;8:49-58.

CASE #10 - Part A

An 8 year old girl, who was previously healthy and has no significant history presents to the ER complaining of pain of 2 days duration about the left knee, mostly on the posterior aspect, she is able to bear weight and has a passive range of motion of 100 degrees of flexion and 10 degrees of extension, there is no joint effusion or swelling and no signs of trauma. She has point tenderness in the posterior aspect of the thigh upon deep palpation. Neurovascular status is normal. Radiographs are unremarkable. Laboratory tests show:

Hemoglobin = 16.3 g/L
White blood cells = 13000 (mostly neutrophils)
CRP = 6.1
ESR = 38 mm/min

Continued on page 12

Challenging Cases: What Would You Do?

continued from page eleven

CASE #10 - Part A, *continued*

An initial diagnosis of a subperiosteal abscess is made.

Question 1:

What is the single most useful imaging study in the evaluation of pediatric musculoskeletal infection?

- A. Plain radiographs
- B. Bone scintigraphy
- C. Real time ultrasound
- D. Computed tomography
- E. MRI

Your Response: ____

Discussion

When evaluating a child with a suspected musculoskeletal infection obtaining high-quality plain radiographs of suspected areas of involvement is essential and should be studied for deep soft-tissue swelling, cortical or metaphyseal bone destruction, and joint effusions. Ultrasonography is helpful in the evaluation of irritable joints, such as the hip and shoulder, that may be difficult to palpate on physical examination. Bone scintigraphy has a role in the assessment of children who do not have obvious localizing signs of infection, or in situations in which a multifocal process is suspected. A bone scan is useful in assessing the limping child without focal examination findings as well as the neonate at high risk of multifocal infection caused by line sepsis in the neonatal intensive care unit; however, false negatives are reported to occur in these circumstances. However, MRI with and without contrast is the most useful single imaging study in the evaluation of pediatric musculoskeletal infection. Images should be examined for the anatomic and spatial extent of the infection; the presence of abscesses, whether intraosseous, intramuscular, subperiosteal, extraperiosteal, or loculated; joint effusions with or without synovial enhancement; evidence of DVT; and the best surgical approach to address all foci of infection, if indicated.

The correct answer is E.

References

Mazur JM, Ross G, Cummings J, Hahn GA Jr, McCluskey WP: Usefulness of magnetic resonance imaging for the diagnosis of acute musculoskeletal infections in children. *J Pediatr Orthop* 1995; 15:144-147.
Connolly LP, Treves ST: Assessing the limping child with skeletal scintigraphy. *J Nucl Med* 1998; 39:1056-1061.

CASE #10 - Part B

An MRI with IV gadolinium contrast was obtained and the images are shown:



The images are consistent with osteomyelitis of the distal femur with a subperiosteal abscess on the posterior aspect. The most likely causative pathogen is:

- A. Salmonella sp.
- B. Staphylococcus aureus
- C. Kingella kingae
- D. Haemophilus influenzae
- E. Bacillus cereus

Your Response: ____

Challenging Cases: What Would You Do? *continued from previous page*

CASE #10 - Part B, continued

Discussion

Over the last decade, our understanding of the etiology of this infection has changed, with increased recognition of *Kingella kingae* and the dramatic increase in community-associated Methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infections. The most common pathogen in community acquired infections is still *Staphylococcus Aureus*. Even in patients with sickle cell disease, in whom the frequency of *Salmonella* infections is significantly higher than in the general population, the most common pathogen overall is *Staphylococcus aureus*.

The correct answer is B.

References

Thomsen I, Creech CB. Advances in the Diagnosis and Management of Pediatric Osteomyelitis. *Curr Infect Dis Rep.* 2011 Jul 26.
Jones HW, Beckles VL, Akinola B, Stevenson AJ, Harrison WJ. Chronic haematogenous osteomyelitis in children: an unsolved problem. *J Bone Joint Surg Br.* 2011 Aug;93(8):1005-10.
Krishnamurthy S, Thimmaiah S, Ramesh A, Biswal N, Menon J, Elangovan S. Osteomyelitis and Pyomyositis Due to *Pseudomonas aeruginosa* in a Child With Sickle β 0-thalassemia. *J Pediatr Hematol Oncol.* 2011 Aug;33(6):e253-5.

The decision to perform surgical drainage was undertaken and a lateral approach was performed. Approximately 100cc of purulent material was obtained and a drain was placed, cultures showed the presence of Methicillin Resistant *Staphylococcus Aureus*. Antibiotic treatment was instituted with Vancomycin and the clinical status of the patient improved rapidly. The decision to discharge from the hospital was made after a 10 day course of IV antibiotics, clinical improvement by the patient, and a CRP level of 0.9. Oral antibiotics are often continued for a total treatment course of 4 to 6 weeks for osteomyelitis.

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From The Editor *continued from page one*

opportunity to contribute. If you are interested in helping with the core curriculum project, or have any ideas that you think would be beneficial for improving the Residents Review, please contact me at steven.frick@carolinashealthcare.org. I look forward to your comments, and on behalf of the POSNA Resident Review Committee, we hope you enjoy this edition.

Sincerely,
Steven L. Frick, MD
Residency Program Director,
Carolinas Medical Center
Charlotte, NC

Technology Corner for Orthopaedic Residents By: Orrin Franko, MD

With the advent of smartphones and tablet computers, mobile platform “apps” are now increasingly used by the orthopaedic community. An app is a self-contained application designed to run on a particular smartphone or tablet device, and the appeal of apps in a medical setting is a result of their intuitive and interactive interface, allowing for the quick reference of information “on the go.” (1-3) Apps have become an invaluable tool in the orthopaedic community; 84% of orthopaedic trainees and surgeons currently have a smartphone and over half already use apps. (4) As of June 2011, Apple boasted over 350,000 apps in the app store, and from August 2010 to April 2011, over a span of just eight months, the number of orthopaedic-specific apps for iPhone and Android increased from 42 to 74 apps. (4-5) A new challenge faced by orthopaedic surgeons will be to keep up with the most useful apps.

The purpose of this column will be to present and review smartphone apps that would be of interest to orthopaedic residents. Each issue will have a different focus, and as technology evolves and grows, so will the apps that are reviewed. The apps presented will reflect general trends in operating system popularity, a market that is currently dominated by Apple’s iPhone. Lastly, and most importantly, the apps presented here will be selected based on user reviews, design and interface, the information presented, and my personal opinion. Readers may find other more useful



Continued on page 14

apps than those included here, and suggestions/comments are always appreciated.

This first issue will focus on 5 free apps that are a “must have” for orthopaedic residents.

AO Surgery Reference

Created by AO and released in November 2010, the AO Surgery Reference app has set the bar for orthopaedic reference apps. The data mirrors information which has been previously existed at www.aosurgery.org but is formatted specifically for the smartphone. The app has an intuitive interface that walks the user through the diagnosis, decision process, preparation, surgical approach, reduction, fixation, and aftercare of fractures. Additional information can be found by selecting the “info” icon next to an option, and reference articles are provided on every page. Some of the most valuable aspects, in addition to the text, are the abundance of images demonstrating fracture patterns, patient positioning, and anatomy/surgical approaches. Ideally, this app can serve as a quick reference while treating a patient or prior to a surgery when no other references are available for review. The greatest limitation to this app is that all data is pulled from the internet in real-time, and thus a data connection (3G or WiFi) is required for the app to function. In addition, some fractures are still not available, but the app suggests that future updates will be included.

Availability: native iPhone, other users can access “m.aosurgery.org”

Strengths: free, published by a leading orthopaedic organization, abundant information

Limitations: requires data connection, some fractures not yet available

Website: www.aosurgery.org

AO Classification

A second app created by the AO Foundation, the classification app allows a user to determine the Muller classification of long-bone fractures by selecting the bone, the segment, and the fracture morphology. In addition, radiographs are included to demonstrate true images of fracture patterns as a supplement to the figures provided. Once a particular fracture is selected, the user can save cases as “favorites” with a memo, a tool that could be valuable for a resident needing to keep track of fracture types while seen on call. The app also includes a “glossary” section that offers supplemental notes such as classification terminology and instructions for identifying fractures. Lastly, all data lives on the device thereby allowing for rapid access and use even without a data access signal.

Availability: iPhone

Strengths: free, no data access required, saved “favorites”

Limitations: no text information about fracture types or treatment

OrthoEvent

This free app is useful for any orthopaedic practitioner who attends or is planning to attend any orthopaedic-related conference. The app is designed to compile information regarding nearly all professional orthopaedic conferences worldwide, as well as organize conferences according to specialty. Once a conference is selected, the app provides dates, locations, abstract deadlines, and links to meeting websites. Overall, the application is a creative and very helpful way to search for conferences that you might not otherwise be aware of.

Availability: iPhone

Strengths: free, intuitive, search by specialty

Limitations: only available in French, may not include all conferences

Website: www.orthoevent.com

Epocrates*

Epocrates has long been the most popular mobile drug reference since early versions of their software for the Palm platform in the early 2000s. They continue to dominate the drug reference market with their iPhone and Android versions. Their app has comprehensive drug reference information, which includes adult/pediatric dosing, black box warnings and contraindications, adverse reactions, safety information, and manufacturer, pricing, and insurance coverage information. In addition, the application provides details about drug interactions. A third useful tool in the app is the “pill identifier.” With this tool, the user can enter details about a pill, including color, shape, coating, scoring, or imprints, and the application returns the list of possible medications with matching photos. Lastly, the app includes an expansive list of MedMath calculators to assist not only with dosing calculations, but also a variety of general medical equations such as BMI or electrolyte correction equations.

Availability: iPhone, Android, BlackBerry, Palm, Windows Mobile

Strengths: free, comprehensive drug data, pill identifier

Limitations: few, if any

Website: www.epocrates.com

Google Translate*

Although Google is well known for search, email, maps and documents, the Google “labs” have produced a number of useful products. One of the most useful apps for the general population, and one that can be especially helpful for residents, is their translator. The app combines voice dictation, language translation, and spoken text into a seamless interface that is effective for over 60 languages. The basic premise is that the user can speak a phrase into the phone, and within seconds the phrase is recognized as

text and translated into a language of choice with the text appearing on the screen. Then, for 25 of the languages, the app can also speak the phrase out loud in the designated language. The translation goes two ways, meaning that a patient can type a response in their native language that would then be translated back into English.

Availability: iPhone, Android

Strengths: accurate dictation, over 60 languages, beautiful integration of text-to-speech

Limitations: only speaks up to 200 characters of text, only speaks 25 languages

References

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3. Silverman D. Are you a member of the 'Apps Culture'? *San Francisco Chronicle*. 2010 Sept 15, 2010.
4. Franko OI. Smartphone apps for orthopaedic surgeons. *Clin Orthop Relat Res*. 2011 Jul;469(7):2042-8.
5. Apple. iPhone App Store. [Internet]: Apple; 2011 [June 16th, 2011]; Apple App Store]. Available from: <http://www.apple.com/iphone/apps-for-iphone/>.

IPOS 2011

By: Jack Flynn, MD

The International Pediatric Orthopedic Symposium is scheduled for December 7 - 10, 2011 at the Walt Disney World Dolphin Resort, Lake Buena Vista, FL. This year special focus is on pediatric fractures and complications, hip disorders in infants and toddlers, pediatric imaging, pediatric spine innovations, limb deformity and pediatric knee disorders. Although these areas will receive special attention, the entire breadth of pediatric orthopedics will be represented: upper extremity, sports, spine, hip, tumor and infection, limb deformity, neuromuscular, foot and ankle, and others.



Jack Flynn, MD

In addition to didactic sessions and panel case discussions, the IPOS Main Sessions will include some novel educational approaches. In order to explore solutions for some of the most vexing pediatric surgical complications, we have an afternoon set aside for a session entitled "getting out of trouble: solving complications". In this session, 12 difficult complications will be described and attacked by the world experts in different pediatric subspecialties, with solutions on how to manage the problems when they

occur. We will have a morning fracture session covering Master's Techniques for some of the more common and difficult fractures, as well as interactive case discussions using the audience response system.

Outside of the Main sessions, IPOS emphasizes hands-on workshops and breakouts. Registrants can choose from five or six specialty breakout sessions on topics such as evaluating the painful hip, challenging pediatric sports cases, management of neglected fractures and infections from the developing world, advanced Ponseti casting, hands-on pelvic osteotomy workshop, and Legg-Calve-Perthes disorder. Our industry sponsors have a number of hands-on workshops which will allow participants to explore new technologies, in many cases using the surgical techniques and implants on saw bone models.

To teach this broad array of main lectures, breakout sessions and hands-on workshops, IPOS will have a faculty of over 60 international experts in our field. We have invited nationally renowned experts in pediatric musculoskeletal imaging, pediatric infectious disease and pediatric neurosurgery to lend interdisciplinary perspective to the problems we treat. There are special sessions designed to mentor and generate enthusiasm among orthopedic residents and fellows (again under the direction of Brian Smith), and a program to host visiting surgeons from the underdeveloped world (under the direction of Rick Schwend). Generous donations by the Shriners Hospitals and POSNA will allow IPOS to offer tuition scholarships to many registrants who may be future pediatric orthopedists. Applications can be found online, and are due by the end of August, 2011.

We encourage you to come to Orlando in December and experience the full breadth of the dynamic field of pediatric orthopaedics. Visit www.posna.org and click on the link for the 2011 IPOS meeting.



Evolution of Surgical Management of Hip Dysplasia

An Interview with Dr. Michael B. Millis

By: Young-Jo Kim, MD



Michael B. Millis, MD

The surgical management of hip dysplasia has evolved substantially in the past three decades, and powerful new corrective osteotomies are now available to correct persistent anatomical abnormalities in teenagers and young adults. Expert execution of these osteotomies can restore more normal biomechanics and stress distribution in the hip, hopefully avoiding early degeneration of the articular cartilage and painful osteoarthritis of the hip. Dr. Michael Millis is the Director of the Adolescent and Young Adult Hip Unit at Children's Hospital Boston, and as a pioneer in these innovative surgeries has been a witness to the major changes seen recently in the treatment of hip dysplasia. His partner, Dr. Young-Jo Kim, also an expert hip surgeon and a member of the Resident Review editorial board, interviewed him to provide a historical perspective of the evolution of surgery for hip dysplasia.

Dr. Kim: "You got started in the hip joint-preservation work long time ago. How did you get interested?"

Dr. Millis: "I was the Chief Resident under Dr. John Hall immediately before Dr. John Emans at Children's Hospital Boston at the end of 1975.

It was sort of the Wild West in some ways compared to what things are like now in terms of hip surgery."

Dr. Kim: "That was when arthroplasty was really coming into vogue, was it not?"

Dr. Millis: "Arthroplasty was in big time vogue, and I think Europe was a little bit ahead of us in that arthroplasty had been used there a little longer, and they had already discovered about the problems of arthroplasty. As a result, they were looking back a little bit on joint-preserving surgery. Meanwhile here in the U.S., everybody was in full-bloom about how wonderful joint replacement was, and whatever lessons U.S. surgeons had learned about osteotomies, had been lost. So the whole idea about doing osteotomies for adults at that time was totally unknown. Dr. Hall and I were together when Heinz Wagner, now ten years dead, and at that point unknown in the U.S., came and gave a Grand Rounds at the Brigham and Women's Hospital in Boston, and talked about all kinds of things including limb lengthening, surface replacements, and osteotomies for congenital hip dislocation. Dr. Hall was sitting in the front row and he turned around to me, and I said "Wow, this is wild stuff! We have to know more about this". The Salter osteotomy was all we were using in Boston for correcting acetabular dysplasia at that time, and even though Dr. Hall trained under Dr. Salter, he recognized that it was good but not good enough. Subsequently, I went and spent almost six months with Heinz Wagner and that totally changed my orthopedic life."

Dr. Kim: "Now, another surgeon from Boston, Dr. Bob Poss, also became in-

terested in hip osteotomies about the same time. How did that happen?"

Dr. Millis: "Bob Poss actually got interested after me, and he had a fellowship and went for six months, spending time with Bombelli in Italy, Irwin Mosher in Switzerland, and Wagner in Germany. Bob was very interested in total joints, and osteotomies, and around mid-1979 Bob started working at the Brigham and Women's Hospital, and I was working at Children's Hospital Boston. Bob started doing intertrochanteric osteotomies mostly, and I brought back the techniques of both the intertrochanteric osteotomy and the spherical acetabular osteotomy from Dr. Wagner. He and I got so interested in these techniques that we thought we should bring these techniques to other people, and that was the genesis of the Harvard Osteotomy Courses."

Dr. Kim: "When was that?"

Dr. Millis: "Well, the first one was in 1984. For four or five years, we were voices in the wilderness, doing this on our own. We thought, however, that other people in the U.S. should learn how to do this besides us, so we started with an osteotomy instructional course at the annual AAOS meeting. I think that was probably in 1983. Bob and I were together on that, and from '83/'84 we started teaching instructional courses at the Academy, and we also had the Harvard Osteotomy Course that was on knees and hips. We gave five of them over a period of ten years, from 1984-1994. We subsequently stopped doing it when people had gotten the idea, and we didn't feel we had to do it anymore. Besides, the Academy took up the torch at that point. I think the rest is history because now it is pretty well established that joint preservation has a place. That's how I got started. I got started because Dr. Hall did a lot of Salter osteotomies on adults, and we got the idea that it wasn't just kids that should benefit from redirection osteotomies – adults should benefit

An Interview with Dr. Michael B. Millis, *continued.*

from these techniques, too. It helped us be more aggressive with the kids and the adolescents, because we started to see the adults who had early hip degeneration from uncorrected hip dysplasia, but it helped us develop techniques for adults because we saw these things work in kids and believed they should work in adults, too.”

Dr. Kim: “But, for a long time now, really for twenty years you were extremely lonely, no? I mean, there was only a small group of people who were very committed to joint preservation surgery in the hip.”

Dr. Millis: “Yes, and I think the fact is it did take some courage, but it took courage not just by me. I can honestly say that if Dr. Hall as the head of orthopaedics at Children’s Boston hadn’t been as supportive, a lot of this stuff wouldn’t have happened. Clem Sledge, who was the head of orthopaedics at Brigham and Women’s, was also supportive. He was supportive of Bob Poss, and Bob and I had each other. Dr. Hall supported both of us, and we had European mentors as well who were unbelievable supportive. That carried us along and I think it’s grown and continued to be believed in by a core of people, although there continues to be a larger group of people who tolerate us rather than actively support us.”

Dr. Kim: “So it must be gratifying to see that now at least the concept of redirection osteotomies about the hip to delay and perhaps avoid hip joint degeneration is quite well accepted.”

Dr. Millis: “Well, I think it is. I think also the concept we see here of having a group of people in a Hip Unit devoted to joint preservation surgeries and research, is that can see the things that happen in the hips in children and adolescents, and see how it plays out in adults. Understanding the natural history is very important, and I think that has helped a lot of people

in a lot of places. It has helped those who choose to do just pediatric hip disease, and it has helped those who do just adult hip disease. To have this group of interested people who are in the middle, straddling both worlds, is very satisfying. I think that some of the things we believed in and worked on early - it is very clear those things work, and that it is gratifying. Of course, it continues at times to be frustrating, and always continues to be interesting. Now a long time into it - it is thirty three years since I started in practice - there are still a lot of unanswered questions all the time.”

Dr. Kim: “Any advice to younger people who are starting out - if they are interested in this kind of career?”

Dr. Millis: “Of course - I think the lessons I have learned are that it helps

“I think that as we look at the three classic prongs of what we do: Patient Care, Teaching and Research - carrying our investigative efforts forward to the patients is an interesting thought.”

unbelievably to have a mentor or two or three mentors. You have to have a lot of energy, and it helps to have a couple of partners as well. I think that is the most important thing. Being interested in the patients is really important, too, and keeping track of your patients - following your patients carefully is really important, because what we do lives and dies by the durability of our results - so a little bit of advice.”

Dr. Kim: “So, where do you think things are going to go from here? Do you think the pendulum has swung the other way too much or...”

Dr. Millis: “Well, I think the pendulum swings back and forth all the time, and it helps not to be overly enthusiastic about any new advance. You and I over a lot of years heard Dr. Hall say

there is nothing that destroys confidence like follow-up, but the truth is I that I think follow-up helps you with your confidence, too, in some ways. I anticipate that we will do better and better reconstructing bad cartilage lesions. I think that there will be better biological solutions, but I don’t think that the mechanical analysis of hip problems or mechanically-based treatments will ever go out of style. While the arthroplasty solutions will likely continue to be improving because there will be more durable bearing surfaces, I don’t see the problem of osteolysis and particle-based damage ever totally going away. I believe the biologically-based joint preserving options will get better, and for the marginal patient I would like to think that you and I will be better able to reconstruct the hip. Arthroplasty surgeons will continue to be able to help in the unsalvageable case, but we should not just be doing arthroplas-

ties on younger and younger people. I think that realignment osteotomies will continue to work very well in dysplastic hips. I also think we will be able to figure out hip impingement pain generators better, and we will be able to figure out which patients could be helped the most, and which ones we can help the least, with joint-preserving surgery.”

“I am very pleased because I think there is a sizable cadre of people who believe in the concept now. I feel very comfortable having a group of people at various stages in their careers who believe in hip preservation. I think what is to come is even more exciting. It is not like I feel like we are in a field that is going to become obsolete because of improving arthroplasty solutions.”

Continued on page 18

An Interview with Dr. Michael B. Millis, *continued.*

Dr. Kim: "Especially in light of the recent controversies in metal on metal replacements."

Dr. Millis: "Absolutely, I think that the "native" hip joint, as Reinhold Ganz likes to call it, has been evolving and improving over a long period of time. It's dealt with a lot of its design issues over many millennia. I think we are going to understand better in the coming decades what activities are better or worse for given shapes of hip joint, and that knowledge is going to be very helpful. We need to do things, like the Framingham heart studies, on musculoskeletal disorders, starting with young kids

and going forward. As I look over the next ten years, I think that is where I want to put a lot of my energy - setting up longitudinal studies so that we understand hip problems like the pathogenesis of femoroacetabular impingement (FAI). I plan to find financial support, and to continue to engender enthusiasm for hip research in people from different walks of life, medical and otherwise, as we go forward. I think that as we look at the three classic prongs of what we do: Patient Care, Teaching and Research - carrying our investigative efforts forward to the patients is an interesting thought. Getting out there, if it is appropriate, to do direct to consum-

er informing about how hips work and fail, seems to me very reasonable. This is also likely to help the primary practitioners. I think that having parents understand a little bit more how joints work and fail, so they keep an eye on their kids, and they get their kids in for medical attention. Maybe that's a direction we should go. I think leveraging our special medical knowledge in various different directions is something we should consider doing, because there are only so many Young-Jo Kim's and so many Michael Millis's. Thanks..."

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