

Resident REVIEW

CUTTING EDGE ORTHOPAEDIC INFORMATION ENHANCING RESIDENT EDUCATION

July 2009

From the Editor, Kenneth Noonan, MD



In this edition, Dr. Richard Schwend presents an article on changes in clinical practice and manpower issues that affect the delivery of pediatric orthopaedics. His summary clearly

points out that today's pediatric orthopaedics is not "your grandfather's specialty." With advances and understanding in spine, trauma, sports and hip pathology; pediatrics is becoming an increasingly more operative field with a need for highly trained surgeons. In order to challenge the perception that only good jobs and practitioners are found in University settings; we are pleased to interview Dr Matt Bueche who is an exceptional pediatric orthopaedist and who has a wonderful non-university based practice.

We further present a series of OITE style questions that focus on hip pathology in growing children and young adults. It's amazing that newer advances and understanding in hip dysplasia (ex: impingement) continues today and requires pediatric orthopaedists to be facile in hip arthroscopy, complex osteotomies and surgical dislocation.

Dr. Jack Flynn has contributed a piece which outlines the history of an ex-
continued on page 2

Challenging Cases: What Would You Do?

CASE #1

A 6 year old boy presents with a one month history of right hip pain and a limp with the following radiograph. Further studies prior to treatment of this patient would include:

- MRI of the lumbar spine
- CT scan of the right hip
- Right hip ultrasound with aspiration
- Basic blood chemistries and thyroid function tests
- No further studies needed

Your Response: _____

CASE #1, continued

Discussion

The radiograph demonstrates a slipped capital femoral epiphysis (SCFE) of the right hip as evidenced by a failure of Klein's line (a line drawn parallel to the superior femoral neck) to intersect the upper epiphysis. His ability to bear weight despite a limp indicates a stable SCFE. This child is much younger than the typical 13 to 15 years for SCFE onset in boys (11 to 13 years in girls). In children 10 years or younger with SCFE a search should be made for underlying

endocrinopathy. These most commonly include hypothyroidism, growth hormone abnormality, and chronic renal failure.

References

Loder R, Whittenberg B, DeSilva G. Slipped capital femoral epiphysis associated with endocrine disorders. *J Pediatr Orthop* 1995;15:349.

The correct answer is D.

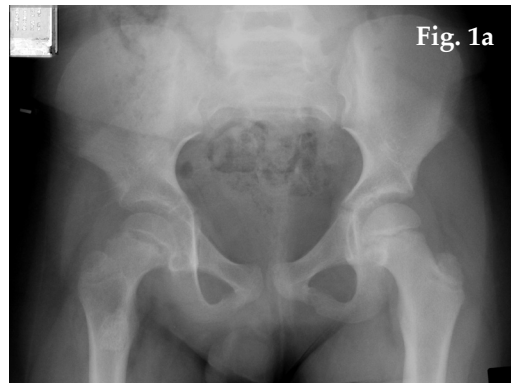


Fig. 1a

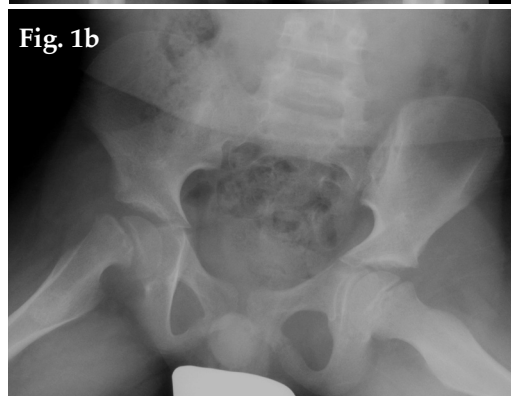


Fig. 1b

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From the Editor,

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cellent education opportunity which is the *International Pediatric Orthopaedic Symposium* held every December in Orlando, Florida. This premier event combines didactic lectures and symposium (which change annually) with hands on workshops with the worlds experts in pediatric orthopaedic surgery. Orthopaedic residents can apply and attend on scholarship dollars. Not only do residents get exposed to the variety that is pediatric orthopaedics; a special mentorship program allows residents to pick the brains of today's pediatric leaders.

We hope you enjoy this edition and feel free to pass your comments on at noonan@ortho.wisc.edu.

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The Future of Pediatric Orthopaedics: What will it Look Like?

Richard Schwend, MD

Those of us who practice pediatric orthopaedics are fortunate to work with a patient population that is truly our world's future. However there has been concern whether enough pediatric orthopedic surgeons are being trained to meet the needs of these young children. The POSNA Workforce Ad Hoc Committee was formed in 2004 to study a decreasing number of orthopedic residents entering pediatric orthopaedic fellowships. The committee surveyed graduating orthopaedic residents from the class of 2004, with 154 responding. Those who chose to entered pediatric orthopaedics did so largely because of their desire to care for children, the broad variety of disorders treated, the role of a mentor and their desire for an academic environment. This past year a record 49 residents matched into pediatric orthopaedics, indicating a marked renewed interest in our specialty.

Over the past 50 years, pediatric orthopaedics has evolved from treating general conditions such as infections, fractures and polio to specialized surgical care of complex disorders. These include pediatric spinal deformity, pediatric hand surgery, sports medicine and operative trauma care. There is an evolution of super sub-specialists, often benefiting from two fellowships, such as the pediatric sports/trauma surgeon or the pediatric spine surgeon with a pediatric and a spine fellowship.

Advanced technology has improved the efficiency of delivering this care but has also led to increased demand for these new technical procedures. For example, new spine implant technology such as VEPTR, has increased what we can do for children who have thoracic insufficiency syndrome. Future scientific discoveries, particularly in genetics and stem cell research, will



Richard Schwend, MD

make our practice more interesting, but will likely also increase the demands on our specialty. There is also a demand for specialized care for young adults with hip impingement from traditional pediatric conditions. Our ability to provide complex procedures should be to our advantage with professional satisfaction and negotiated special fee schedules.

Pediatric orthopaedic surgeons are now busier treating patients who, in the past, were cared for by general orthopaedic surgeons. For instance, increasing number of children with fractures and trauma are referred to children's hospitals. This evolution is most critical at those children's hospitals that do not have an orthopaedic residency program. Kasser et al also documented a dramatic shift in the location of trauma care over a 13 year period in New England (1). Whereas in 1991, 63% of supracondylar humerus fracture care was provided locally by community orthopaedic surgeons, by 1999 only 32% were so treated. That the length of stay was 1.4 days in the pediatric specialty hospital compared to 2.2 days in the com-

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The Future of Pediatric Orthopaedics,

continued from page 2

munity setting does indicate increased efficiency with this evolution. Pay for call, dedicated daytime orthopaedic trauma rooms and physician extenders should help us to deliver this care.

With increasing demand, there will be a need for more of us. How many pediatric orthopaedic surgeons will we need? Probably the simplest prediction method utilizes the US Census estimate that the population will continue to grow annually at a rate of 0.88%, or by nearly 25 million over the next decade. These will likely require a similar increase in fellows trained/year. Since 1997 there has been an average of 24 new pediatric orthopaedic surgeons trained/year. The demands for supply of our subspecialty are less dependent on an aging population model. Therefore, we believe a conservative estimate, that future need will justify 8-10 *additional* pediatric orthopaedic surgeons trained each year, a total of 32-34 trained/year. Clearly the future is positive and there will be training and career opportunities for those interested in our specialty. However, there likely will still be additional demands to provide comprehensive musculoskeletal health care to children. Partly due to work hour regulations, we are experiencing the evolution of collaborative arrangements with physician assistants and nurse practitioners, employed by and working collegially with physicians (2).

Although there is room for more of us, our future depends more on the *quality* our workforce and the product we deliver. One of the key factors for residents going into pediatric subspecialties is the influence of a mentor, and this applies to pediatric orthopaedics as well. Medical students should be encouraged to engage in rotations on the pediatric orthopaedic service and in research projects. Since medical students may have a summer available

early during their preclinical years, a funded summer research program is an effective way to involve students in meaningful research with a mentor. Female and minority medical students who show an interest and aptitude should be personally encouraged to consider a career in pediatric orthopaedics. Residents and students are eligible for scholarships through POSNA to the International Pediatric Orthopaedic Symposium (IPOS) and should apply. The American Academy of Pediatrics, Section on Orthopaedics has monetary awards for best fellow, resident or student paper presentation at the AAP National Conference and Exhibition. The next Section meeting will be in Washington DC, October 17, 18, 2009.

About 50% of a pediatric orthopaedic surgeon's income comes from in-office, non-operative musculoskeletal medicine problems, 33% from on call trauma care and only about 17% from tertiary care surgery such as surgery for DDH, clubfoot, or scoliosis (3).

Although orthopaedic residents have expressed concern about the large number of non-operative cases, in the future this will be to our benefit since health care reform legislation, which may be passed within the year, will likely provide preferential reimbursement for office based care. Since this care is not effectively taught during pediatric residency, we will continue to be the source of the highest quality musculoskeletal care to children. Our future in this process is secured as long as we consistently take leadership responsibility to advocate for the musculoskeletal health of children, both locally and nationally and show better clinical outcomes. In the future we likely will be more involved with unit billing in which the physician and the children's hospital accept common risk and a single fee. Pediatric orthopaedic surgeons are of immense value

to a hospital, but we need to better understand our value and negotiate from a position of strength.

Workforce policy decisions are typically in the hands of the government with its emphasis on access and cost containment. We are fortunate that children's health issues traditionally receive sympathy from in Washington, as long as we are seen to be advocating for our patients, rather than for ourselves. The area that we can control, the quality of our workforce and the product we deliver to our young patients, should be our primary focus. We expect that by constantly improving our workforce and our professional work environment we can improve our ability to make a difference for our young patients and for society.

References

1. Kasser JR. Location of treatment of supracondylar fractures of the humerus in children. *Clin Orthop Relat Res.* May 2005(434):110-113.
2. Mubarak S. Podium Presentation at POSNA annual Meeting. Paper presented at: Pediatric Orthopaedic Surgeons of North American Annual Meeting, 2007.
3. Ward WT, Ebersson CP, Otis SA, et al. Pediatric orthopaedic practice management: the role of midlevel providers. *J Pediatr Orthop.* Dec 2008;28(8):795-798.

Meet Dr. Matt Bueche – Pediatric Orthopaedist, Private Practitioner, and the POSNA Historian All in One!

Michelle Caird, MD

Across North America, pediatric orthopaedists practice in a number of different settings including university based or private practice, with many or few partners, and with varying degrees of subspecialization. Matt Bueche practices in a private practice setting in the Western Chicago Suburbs. He has been a POSNA member since 1993 and is extremely active in the society. He serves as the POSNA Historian and is a favorite course faculty member for the annual International Pediatric Orthopaedic Symposium. He recently took the time to answer a series of questions about his background and pathway to pediatric orthopaedics, his current practice, and bits of “Bueche Wisdom” for this newsletter.

Where you were born and raised?

I was born in Flint, MI and grew up in Flushing, (Michigan) a small bedroom community just west of Flint. Our high school was reasonable size, with over 500 in my graduating class. Somewhere I got the idea that smart kids went to law school or med school. Since I liked science better than writing papers, I thought I should be a doctor.

Who stimulated you to consider a career as children’s orthopaedist?

Of course, we go into Orthopaedics because it is the most fun of medical specialties, and we work in Pediatrics because it is the most fun you can have in Orthopaedics. In Ortho, the residents tended to look at the calls from the ER as another great chance to fix something, or as one of my colleagues would say “play a little *bone music*.”

Where did you do your residency and fellowship training?

I did undergraduate, medical school and residency at the University of Michigan. I started dating Kim Lindenmuth soon after she was accepted into medical school at Michigan, and



Dr. Matt Bueche (on right) with Dr. Hugh Watts.

we married after her second year and my first. After she matched in Ophthalmology at Michigan, I worked very hard to get into the residency program in Ann Arbor. My most influential professors were Bob Hensinger, John Herzenberg, and Bill Phillips.

My Michigan mentors told me I should do fellowship at the Texas Scottish Rite Hospital in Dallas. Prior to interviewing there, I knew that I did not really belong at such a prestigious place, knowing I was out of my league and really just humoring my advisors. But to my surprise the staff, despite their stellar reputations and high-powered CVs, were very approachable and welcoming. I jumped at the chance to go there for my fellowship

At TSRH my staff were Tony Herring, Jim Roach, Charlie Johnston, John Birch, and Steve Richards. My Dallas year was the shortest 52 weeks of my life, and probably the most enjoyable.

What do you do for fun?

Other than answering questionnaires for newsletters, I play basketball two to four times a week, try to cycle to work when possible (weather in Chicago can be iffy) and windsurf.



Dr. Bueche windsurfing.

What led you to work at your current location?

Well, I certainly did *not* plan to be in private practice. That option barely existed in 1990 as I finished fellowship.

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Dr. Matt Bueche, *continued from previous page*

I did want to get back to the Midwest, and sent out my CV to the major teaching hospitals in the Great Lakes area. Kamal Ibrahim was part-time staff at Loyola University-Chicago and he invited me to join him. After many years, Loyola wanted full-time staff but we declined in favor of the private side. As we left the academic fold, we joined a large Orthopaedic group in the Western Chicago Suburbs. The group has specialists in all the major areas and they had pursued us doggedly, as they really wanted to include pediatrics in the mix.

Describe your current practice profile.

Our merged group has expanded to 21 orthopaedic surgeons in five offices, practicing at four community hospitals. I see only pediatric patients, and I have three other fellowship-trained pediatric orthopaedic partners. We cover the entire spectrum of orthopaedic conditions with the exception of musculoskeletal oncology.

What types of patients do you tend to focus on?

Among our pediatric ortho section, we don't have strong subspecialty interests, although Kamal Ibrahim and I do the operative spine cases, and Brian Lindell and Denise Ibrahim do the arthroscopy. It's hard to keep up with all skills in all procedures, even while practicing strictly pediatric orthopaedics.

Do you have residents visit you? Who helps you in clinic and the OR?

Primary care residents will occasionally shadow in clinic, but we have no immediate affiliation with any orthopaedic training program. We have Physician Assistants help in the OR, and one of the PAs is devoted to pediatrics in her office practice.

How often are you on call?

I am on every third night. I provide backup to the adult orthopaedists. They see all wrist and forearm frac-

tures. As peds backup, I see all pediatric elbow injuries, femur fractures, infections, and inpatient consults, including the newborn nursery. The result is that I'm available very often, but for a caseload that is not too burdensome. It can get busy in Spring and Summer in this temperate climate.

of the web and digital radiography can get expert opinion a lot quicker now that when I started in 1990.

“Of course, we go into Orthopaedics because it is the most fun of medical specialties, and we work in Pediatrics because it is the most fun you can have in Orthopaedics.”

What are the advantages for caring for children at a non-university setting?

Well, you really are a part of the community, likely to see your patients at dance recitals or ball games.... I feel that I control my practice, especially schedule and types of cases I do, much more now than when I was at the University. I am an owner of the practice, and I feel a strong responsibility for its success.

What are the disadvantages of working at a non-university setting?

You may not get the most exciting, most challenging operative cases, particularly if one practices in community hospitals. This is not the case with all private practice situations; two of my good friends from fellowship, Jay Shapiro and Jeff Neustadt, have built extremely successful private practices at non-university pediatric hospitals in Austin, TX and St Petersburg, FL. Both do very complex spine surgery in a private practice setting.

When starting out at a non-academic practice, how easy is it to get mentoring for tough cases?

Mentors are everywhere. POSNA is a very inclusive organization and a very altruistic one. I think it would be tough to start out as the only pediatric specialist in an area, but the availability

What are the essential practice resources needed to succeed as a pediatric orthopaedist at a non-academic center? Do you get financial support from the hospital or your non peds partners?

We do benefit from being part of a large group. The “eat what you kill” formula does not work when pediatric orthopaedists affiliate with adult low back specialists. Some support from the group is needed to balance the effort we make in increased availability and for the good will we generate as the only practice in our immediate area with full-time pediatric coverage.

Are there certain cases that you won't do because of institutional deficiencies?

Well, I did shoo the VEPTR rep away from the office. Community hospitals may not be the best place to save lives by expanding a chest in Jeune's Asphyxiating Dysplasia.

When considering employment at a non-academic medical center as a pediatric orthopaedist...what are the pitfalls to avoid in negotiations?

This is a hard problem, as many private groups will be looking to hire their first pediatric orthopaedist in the next few years. We do not bring in the

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Challenging Cases: What Would You Do?

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CASE #2

A 12 year old boy presented with a 3 month history of right lateral thigh and groin pain with running or sports. The following radiograph was obtained. Initial treatment should include:

- A. Weight bearing as tolerated with physical therapy for hamstring stretching.
- B. In situ screw fixation right proximal femur with starting point on anterior neck
- C. Open reduction and internal fixation of the fracture
- D. Right hip arthrogram with adductor tenotomy and Petrie casting
- E. In situ screw fixation right proximal femur with starting point on lateral shaft

Your Response: _____



Fig. 2a



Fig. 2b

Discussion

The radiograph demonstrates a slipped capital femoral epiphysis (SCFE) of the right hip as evidenced by a failure of Klein's line (a line drawn parallel to the superior femoral neck) to intersect

CASE #2, continued

the upper epiphysis. His ability to bear weight despite a limp indicates a stable SCFE which has a better prognosis than unstable SCFE. Treatment should be in situ screw fixation with the goal of placing the tip of the screw in the center of the epiphysis and perpendicular to the physis to allow the best fixation. In the vast majority of SCFEs the epiphysis slips posteriorly on the neck so the best starting point is on the anterior neck of the femur rather than lateral on the shaft.

References

Klein A, Joplin R, Reidy J, et al. Roentgenographic features of slipped capital femoral epiphysis. *Am J Roentgenol* 1951;66:361.

Loder RT, Richards BS, Shapiro PS, et al. Acute slipped capital femoral epiphysis: the importance of physeal stability. *J Bone Joint Surg* 1993;75-A:1134.

The correct answer is B.

CASE #3

A 6 year old male presents for evaluation of his asymptomatic right hip. He has undergone a liver transplant at age 4 and has taken multiple immunosuppressive medications, including high dose prednisone. An incidental radiograph taken to evaluate abdominal pain 1 year ago revealed an abnormality of his hip, prompting orthopedic referral (Figure 3). Recurrent hospitalizations delayed the visit, with current radiographs presented as (Figure 4). Examination reveals a 5 mm leg length discrepancy full hip range of motion. His family reports a slight limp with excessive activity, but otherwise no complaints. The most appropriate option for treatment is:

- A. varus osteotomy
- B. closing wedge valgus osteotomy
- C. trochanteric growth arrest
- D. shelf acetabuloplasty
- E. trochanteric transfer and contralateral distal femoral epiphyseodesis.

Your Response: _____



Fig. 3

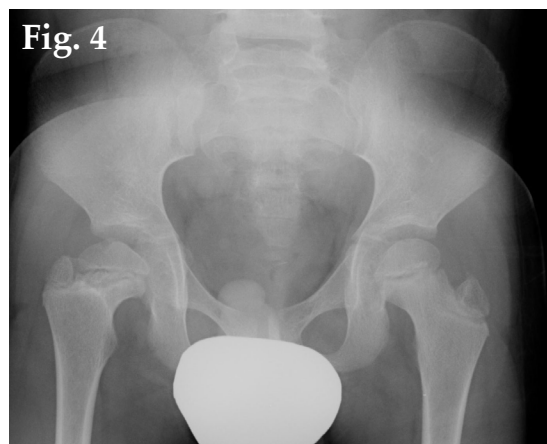


Fig. 4

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Challenging Cases: What Would You Do?

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CASE #3, *continued*

Discussion

Treatment with corticosteroids may result in avascular necrosis of the femoral head and result in collapse of the head or abnormal growth. In this case, the head is spherical, but the neck is short and the growth of the capital femoral physis has been retarded. Given the decreased articulo-trochanteric distance, abductor weakness can be anticipated and the parents note occasional limping. Varus osteotomy would worsen the abductor weakness, and closing wedge valgus osteotomy would worsen the leg discrepancy. While the head is slightly uncovered, shelf acetabuloplasty is a salvage procedure which would not address the femoral deformity. While distal trochanteric transfer would be a potential option for treatment, concomitant contralateral distal growth arrest would be contraindicated in a 6 year old with a 5mm discrepancy. It would also be aggressive in a debilitated transplant patient. Therefore, the best initial treatment would be trochanteric arrest (C), with transfer reserved for persistent symptomatology.

References

Pucher A, Ruszkowski K, Bernardczyk K, Nowicki J. The value of distal greater trochanteric transfer in the treatment of deformity of the proximal femur owing to avascular necrosis. *J Pediatr Orthop*. 2000 May-Jun;20(3):311-6

Iwersen LJ, Kalen V, Eberle C. Relative trochanteric overgrowth after ischemic necrosis in congenital dislocation of the hip. *Pediatr Orthop*. 1989 Jul-Aug;9(4):381-5.

The correct answer is C.

CASE #4

A 16 year old basketball player presents complaining of anterior hip pain with activity. Pain is also present with prolonged sitting. She notes occasional clicking in the groin which also causes pain. Exam reveals pain with flexion and internal rotation. All of the following radiographic findings might be seen in this case of femoral acetabular impingement except:

- A. "crossover sign" on AP pelvic radiograph
- B. Bony prominence at femoral head/neck junction
- C. Increased acetabular anteversion
- D. Labral tear on magnetic resonance imaging
- E. Coxa profunda

Your Response: _____

Discussion

Femoroacetabular impingement is an increasingly recognized condition. Patients present complaining of deep groin pain and may be diagnosed with a litany of non-orthopedic conditions, such as inguinal hernia or pelvic pain. The impingement sign is elicited by internally rotating the flexed hip, causing pain. Clicking or snapping in the groin may represent a labral tear or tight psoas tendon.

Radiographic evaluation consists of a standing pelvic radiograph and frog lateral. Findings may include the 'crossover sign', which represents acetabular retroversion, a bump at the head/neck junction on the lateral view, coxa profunda, and acetabular protrusion. Impingement from a prominent femur (cam impingement) or from relative over coverage anteriorly (pincer impingement) leads to symptoms and potential labral pathology. This is best visualized with MR arthrography. All of the findings be seen, with the exception of *decreased* anteversion (increased retroversion is typical).

CASE #4, *continued*

References

Javad Parvizi, MD, FRCS, Michael Leunig, MD and Reinhold Ganz, MD Femoroacetabular Impingement *J Am Acad Orthop Surg*, Vol 15, No 9, September 2007, 561-570
Fadul DA, Carrino JA. Imaging of femoroacetabular impingement. *J Bone Joint Surg Am*. 2009 Feb;91 Suppl 1:138-43.

The correct answer is C.

CASE #5

A 16-year-old soccer player complains of activity related hip pain for the last 6 months. Examination reveals a normal gait and full range of hip motion without pain. A radiograph of his pelvis is shown in Figure 1. The next most appropriate study is:

- A. False profile view of the both hips.
- B. CT scan of the pelvis with 3-D reconstruction.
- C. Bone scan with pin hole collimation.
- D. MRI with gadolinium.
- E. Arthrogram.

Your Response: _____

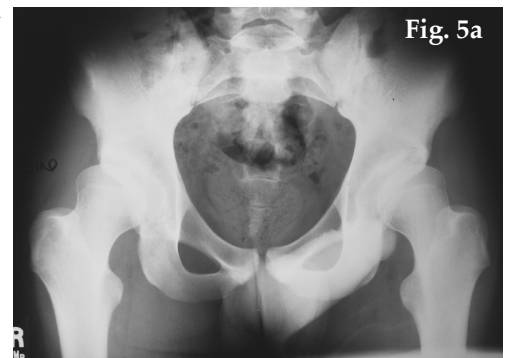


Fig. 5a

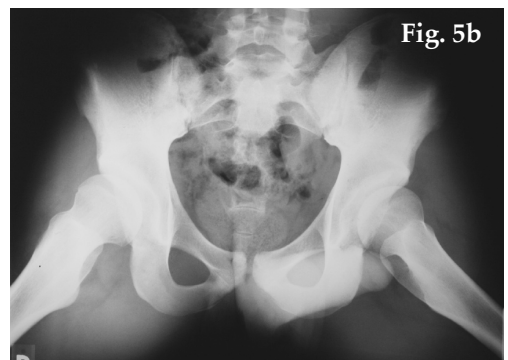


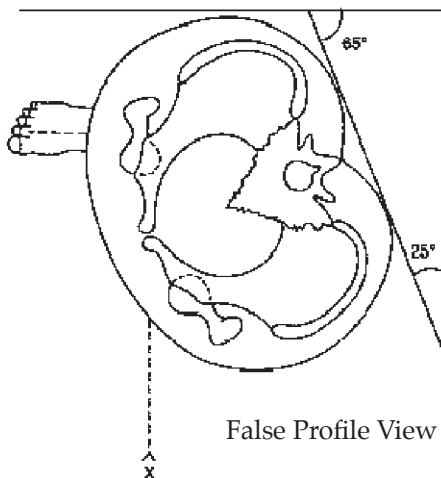
Fig. 5b

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Challenging Cases: What Would You Do?

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CASE #5, continued



False Profile View

Discussion

Patients suspected of having symptomatic dysplasia should have plain radiographs, including an anteroposterior radiograph of the pelvis taken with the patient standing, a false profile view, and an abduction internal rotation view of the pelvis. The anteroposterior radiograph of the pelvis and false profile view will help to quantify the degree of the dysplasia. The abduction view is important in determining whether the hip can be concentrically reduced in the acetabulum. Computed tomography scanning and magnetic resonance imaging are reserved for patients who are operative candidates. Computed tomography scanning can aid in the planning of complex pelvic osteotomies. Magnetic resonance imaging especially is useful for delineating labral disease. It is this combination of history, physical examination, and radiographic workup that will allow successful treatment of the dysplastic hip before the development of osteoarthritis.

References

Garbuz DS, Masri BA, Haddad F, Duncan CP: Clinical and radiographic assessment of the young adult with symptomatic hip dysplasia. *Clin Orthop Relat Res.* 2004 Jan;(418):18-22.

Preferred response: A.

CASE #6

A 17 year old presents with a broad-based gait, foot deformities and frequent tripping and falling. His radiograph is shown in Figure 6. The most likely diagnosis is:

- A. Dejerine-Sottas disease
- B. Tethered cord
- C. Refsum's disease
- D. Charcot-Marie-Tooth disease 1A
- E. Becker's muscular dystrophy

Your Response: ___



Discussion

Hip dysplasia may be the initial sign clinical sign in patients with Charcot-Marie-Tooth disease (CMT). There is considerable variability in the age of onset as well in the presenting symptoms in the most common form of the disease (CMT type 1 A). **CMT1A** is an autosomal dominant disease resulting from a duplication of the gene on chromosome 17 that carries the instructions for producing the peripheral myelin protein-22 (PMP-22). The PMP-22 protein is a critical component of the myelin sheath. Any child or adolescent presenting with late presenting dysplasia and a wide based gait should be examined for signs of peripheral neuropathy.

References

Walker JL, Nelson KR, Heavilon JA, Stevens DB, Lubicky JP, Ogden JA, VandenBrink KA: Hip abnormalities in children with Charcot-Marie-Tooth disease. *J Pediatr Orthop.* 1994 Jan-Feb;14(1):54-9.

Bamford NS, White KK, Robinett SA, Otto RK, Gospe SM Jr.: Neuromuscular hip dysplasia in Charcot-Marie-Tooth disease type 1A. *Dev Med Child Neurol.* 2009 May;51(5):408-11.

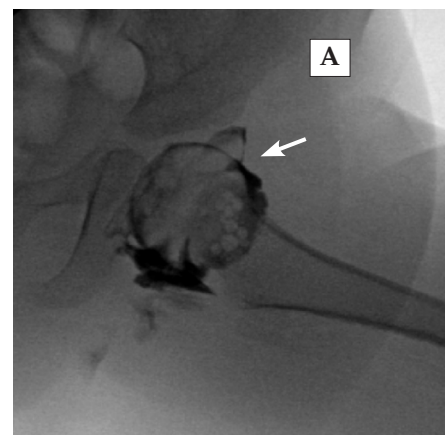
Preferred response: D.

CASE #7

In between what two anatomical structures defines the "thorn" of dye labeled as A?

- A. The psoas tendon and the labrum
- B. The epiphysis and the transverse acetabular ligament
- C. The labrum and the capsule
- D. The greater trochanter and the lesser trochanter

Your Response: ___



Discussion

The "thorn sign" is potential space created by the insertion of the capsule upon the labrum. This is a sign that the hip is reduced and the labrum is no longer infolded creating a block to reduction.

References

Ishii Y, Weinstein SL, Ponseti IV. Correlation between arthrograms and operative findings in congenital dislocation of the hip. *Clin Orthop Relat Res.* 1980 Nov-Dec;(153):138-45.

The correct answer is C.

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Challenging Cases: What Would You Do?

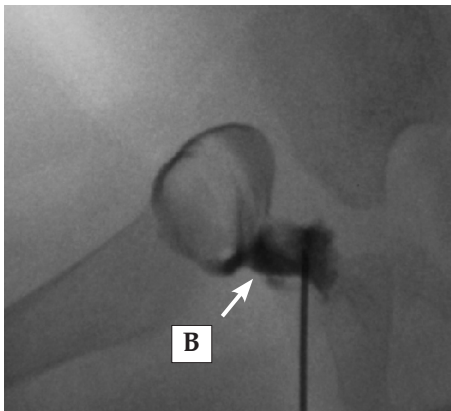
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CASE #8

In this hip dislocation, which obstacle to reduction is marked by the narrowing of the dye marked as B?

- A. Transverse acetabular ligament
- B. Pulvinar
- C. In-folded labrum
- D. Inferior capsular restriction

Your Response: _____



Discussion

The hourglass shape of the capsule is the consequence of the proximal femur not resting in the acetabulum and is one of the obstacles to reduction. Some also believe that the constriction is caused by the psoas tendon. The obstacles to reduction include a tight transverse acetabular ligament, pulvinar, infolded labrum, psoas tendon, and inferior capsular restriction.

References

Ishii Y, Weinstein SL, Ponseti IV. Correlation between arthrograms and operative findings in congenital dislocation of the hip. *Clin Orthop Relat Res.* 1980 Nov-Dec; (153):138-45.

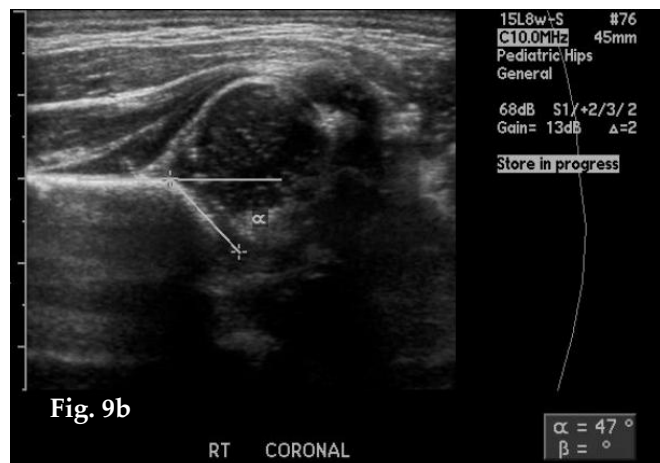
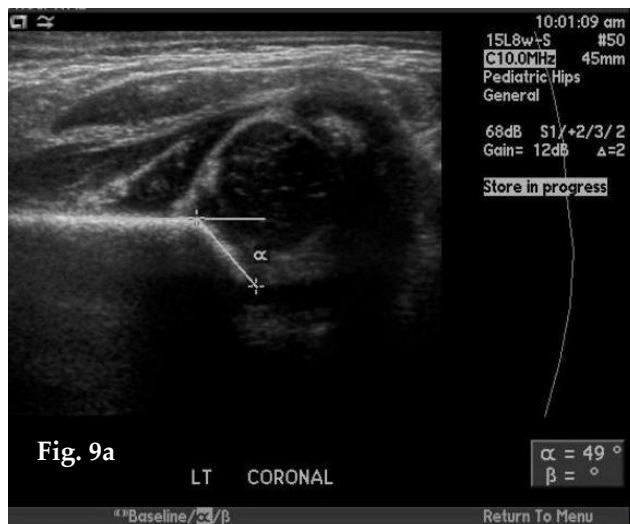
The correct answer is D.

CASE #9

A one month old boy, whose older sister was treated for DDH, is sent for a screening U/S. The left and right hip U/S images are shown (Fig 9A and 9B). Both α angles are less than 50 degrees. The next step in management of this patient is:

- A. Hip development is normal, no follow-up is needed
- B. Triple diapering and repeat U/S at one year
- C. Fitting for a Pavlik harness and repeat U/S in two weeks
- D. Closed reduction and spica casting
- E. Open reduction and spica casting

Your Response: _____



CASE #9, continued

Discussion

The Graf method of U/S examination utilizes a single, static coronal image to assess whether or not the head is reduced, and quantify the depths of the bony rim (α angle) and cartilaginous rim (β angle) of the acetabulum. Graf has divided hips into types, based on the value of the α and β angles. Type I (mature) hips have an α angle greater than 60°. Type IIa (immature hips) have an α angle between 50 and 59° in children less than 3 months of age.

The U/S shows bilateral Type IIc (severely deficient hips) with α angles less than 50°. A Pavlik harness is the treatment of choice in children under 6 months of age. The Pavlik harness restricts extension and adduction, preventing subluxation/dislocation.

Proper use of a Pavlik harness is 95% effective in stabilizing hips with DDH. Since the hip is located there is no need for open or closed reduction at this point. Ultrasounds are also of poor utility once the femoral head is ossified as would be expected at one year.

References

Graf, B, Wilson, B: Sonography of the Infant Hip and its Therapeutic Implications. Germany, Chapman and Hall, 1993.

Grill, F, et al. The Pavlik harness in the treatment of the congenitally dislocating hip: report on a multicenter study of the European Pediatric Orthopaedic Society. *J Pediatr Orthop*, 1988;8:1-8.

Pavlik, A. The functional method of treatment using a harness with stirrups as a primary method of conservative therapy for infants with congenital dislocation of the hip. *Clin Orthop* 1992;17:165-169.

The correct answer is C.

Continued on page 10

Challenging Cases: What Would You Do? continued from page 9

CASE #10

AP pelvis (Figure 10) x-ray of a 6-year-old child with a history of left leg or hip area pain and a limp for several months. The radiograph shows sclerosis and flattening of the left capital femoral epiphysis consistent with Legg-Perthes disease. There is however noted to be some changes and irregularity of the right femoral head as well. In the setting of bilateral Perthes disease, which of the following conditions needs to be considered and ruled out:

- A. Hypertension.
- B. Hyperthyroidism.
- C. Hypothyroidism.
- D. Hyperparathyroidism.
- E. Caisson's disease.

Your Response: ____



Discussion

A 6yo boy with possible bilateral Perthes: Note clear evidence of sclerosis left femoral head and irregularity of right femoral epiphysis. Bilateral Perthes disease is rare and one possible cause is Hypothyroidism. Differential diagnosis may also include multiple epiphyseal dysplasia, or Meyer's Disease or idiopathic bilateral AVN which typically would be in older children. A child this age with bilateral Perthes would need Thyroid function tests to rule out a hypoactive thyroid.

CASE #10, continued

References

- 1) OKU Pediatrics 3, Mark Abel ed, 2006, Chapter 13, "Legg-Perthes Disease," page 170.
- 2) Guille JT, Lipton GE, Tsirikos A, Bowen JR: "Bilateral Legg-Perthes Disease," *JPO* 2002, 22(4): 458-63.

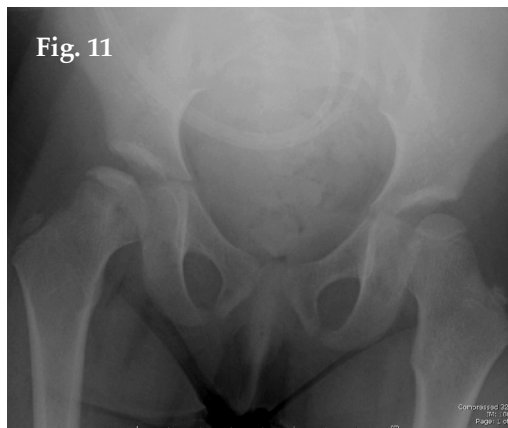
The correct answer is C.

CASE #11

The attached radiograph (Figure 11) shows Perthes disease in a 4-year-old girl who has minimal restriction in range of motion and does walk with a slight limp. Appropriate treatment at this time in this minimally symptomatic child would include:

- A. Valgus osteotomy of the proximal femur.
- B. Varus osteotomy of the proximal femur.
- C. Salter innominate osteotomy of the pelvis.
- D. Hyperbaric oxygen treatment.
- E. Restricted activity and range of motion physical therapy.

Your Response: ____



CASE #11, continued

Discussion

Prognosis of Perthes is based to a large extent on the age of onset. The younger the child at the time of diagnosis, the longer the child has to remodel the femoral head. A young child like this with minimal symptoms or slight loss of motion may be well managed with activity restriction and maintenance of range of motion.

References

- 1) OKU Pediatrics 3, Mark Abel ed, 2006, Chapter 13, "Legg-Perthes Disease," page 172-3.
- 2) Gigante C, Frizziero P, Turra S: "Prognostic Value of Catterall and Herring Classification in Legg-Perthes Disease," *JPO* 2002, 22(3): 345-9.

The correct answer is E.

CASE #12

A healthy 5 year old girl presents with a 2 week history of right groin pain and a limp. She walks with an antalgic gait. She has 30 degrees of hip abduction on the right compared with 60 degrees is on the left. She experiences right groin pain with more than 10 degrees of internal rotation. Based on the clinical presentation, physical examination and radiographs (provided), the most appropriate next step would be to:

- A. Obtain ESR and C-Reactive protein
- B. Perform an MRI scan
- C. Start the child on NSAIDs, limit running sports and institute physiotherapy
- D. Aspirate the hip joint and do a needle/core biopsy of the femoral head
- E. Perform an innominate or proximal femoral varus osteotomy

Your Response: ____

Continued on next page

CASE #12, continued



Fig. 12

The presentation and physical findings are consistent with an irritable hip that includes a wide differential diagnosis. The radiographs demonstrate epiphyseal changes consistent with Legg-Calve-Perthes disease. The prognosis in a 5 year old with Herring Type A involvement (preserved height of the lateral pillar in the early fragmentation stage of the disease) is excellent. Only symptomatic treatment is warranted. This includes limitation of higher impact activities, use of NSAIDs to reduce the irritability, and physical therapy to improve the range of motion. Recreational activities such as swimming and biking are permissible and might improve range of motion. Blood tests to rule out a joint or bone infection or an inflammatory arthritis are not indicated, with the positive radiographic findings and the absence of any constitutional symptoms. MRI scan is unnecessary when the radiographs show features of early fragmentation. If the radiographs were normal, an MRI might pick up signal changes associated with early Perthes disease, or an infectious process (osteomyelitis or psoas abscess) if clinical and laboratory investigations indicated a possible infection. Neither aspiration of the hip joint nor a biopsy of the femoral head are indicated. An innominate osteotomy or a proximal femoral varus osteotomy to improve the containment of the femoral head may be indicated in children over 8 years with Lateral Pillar B or B/C involvement, after range

CASE #12, continued

of motion has been restored by rest, physiotherapy and/or anti-inflammatory medications.

References

Rosenfeld SB, Herring JA, Chao JC. Legg-Calve-Perthes disease: a review of cases with onset before six years of age. *J. Bone Joint Surg Am.* 2007 Dec; 89(12):2712-22.

Preferred response: C.

CASE #13

A 8 year old boy with bilateral spastic cerebral palsy who is non-ambulatory is observed to experience discomfort during diapering and dressing, and prolonged sitting. His parents report decreased motion of both hips which makes perineal care increasingly difficult. Passive abduction is limited to 15 degrees and causes him to cry. Radiographs of the pelvis are provided. Appropriate recommendation at this time would be:

- A. Increased physical therapy and hip abduction orthosis**
- B. Injection of botulinum toxin A into adductors followed by hip abduction orthosis**
- C. Bilateral adductor and psoas lengthening alone**
- D. Bilateral proximal femoral varus derotation osteotomies, peri-acetabular pelvic osteotomies in addition to soft tissue releases**
- E. Bilateral femoral head resections and valgus osteotomies**

Your Response: _____

CASE #13, continued



Fig. 13

Discussion

This 8 year old boy with spastic quadriplegia has bilateral hip subluxation with significant acetabular dysplasia with more severe changes on the left side. He is symptomatic because of the contractures or the hip subluxation; and the associated contractures are interfering with caregiving. Non-operative measures such as physical therapy to increase range of motion are unlikely to improve the range of motion. Botulinum toxin A injections might reduce some discomfort but unlikely to improve fixed contractures. Soft tissue releases might increase range of motion but will not address the bony pathology. Bilateral hip reconstruction would include proximal femoral varus derotational osteotomies to address the coxa valga and increased anteversion, and periacetabular pelvic osteotomies to address the acetabular dysplasia (usually posterolateral deficiency). Salvage surgery such as femoral head resection is only indicated in the face of advanced arthritic changes or femoral head deformity.

References

1. Miller F, Girardi H, Lipton GE, et al. Reconstruction of the dysplastic hip with periliacal pelvic and femoral osteotomy followed by immediate mobilization. *J Pediatr Orthop* 1997; 17:592-602.
2. Graham HK. Painful hip dislocation in cerebral palsy. *Lancet.* 2002; 359:907-8.

Preferred response: D.

One of the Most Unique Educational Offerings..IPOS

Jack Flynn, MD

The International Pediatric Orthopaedic Symposium (IPOS) is one of the most unique educational offerings in all of Orthopaedic Surgery. In its current form, IPOS is a co-sponsored program by the American Academy of Orthopaedic Surgeons and the Pediatric Orthopaedic Society of North America. With a rich history in pediatric orthopaedics, IPOS offers a great deal for orthopaedic residents, whether they are planning on a career in pediatric orthopaedics or a career in general orthopaedics or some other subspecialty.

A course called the International Pediatric Orthopaedic Symposium was first conceived by Myke Tachdjian more than 20 years ago. Dr. Tachdjian died suddenly in 1996. Dr. Chad Price then led a group of pediatric orthopaedic surgeons who envisioned the resurrection of the course as one of the premier pediatric orthopaedic educational events. Under Dr. Chad Price's leadership, IPOS was originally co-sponsored by the Nemours's organization. Dr. Price engineered a cooperative venture between POSNA and AAOS and ran the course for 5 years with great success. Dr. Flynn took over management of the course in 2008, with a plan to continue the extremely successful philosophy that has made the course so popular.

IPOS is a symposium, not a didactic course. It is meant to be a highly interactive educational event in which short lectures by experts are supplemented by interactive case discussions, hands on workshops, debates and skill sessions. Only a small portion of the course is review material.

However, there is enough overall basic pediatric orthopaedic education that any resident could get a taste of the full spectrum of pediatric orthopaedics in this 4 day course. IPOS has a strong surgical bent, with lectures and discussion sessions designed to draw technical pearls and surgical recommendations from the expert faculty.

Each year, IPOS is held the week after Thanksgiving in Orlando, Florida. The faculty is huge: more than 60 American, Canadian and other international pediatric orthopaedics faculty arrive to share their expertise. The course is designed to cover the full spectrum of pediatric orthopaedics: trauma, sports medicine, spine, hip, foot and ankle, upper extremity, neuromuscular, and tumors and infection. The rotating faculty features many of the giants in pediatric orthopaedics, including Drs. Vern Tolo, Al Crawford, Chad Price, Jim Beaty, Tony Herring, and many others. Several international guests bring a unique prospective. This year, we welcome Dr. Michael Bell, Dr. Deborah Eastwood, Dr. Alain Dimeglio and Dr. Muharrem Yazici to the program. With a special focus this year on upper extremity problems in young athletes, IPOS has invited George Paletta (team orthopaedic surgeon for the St. Louis Cardinals) to lead the discussion.

Each day, main lecture sessions or concurrent lecture sessions are mixed with industry or CME breakout sessions to teach such skills as Ponseti casting, intramedullary nailing and submuscular plating of femur fractures, the use of the variety of spinal instru-

mentation, hip osteotomies, arthroscopy and fracture management. There are also special focus sessions designed to foster an in-depth analysis of specific conditions: tarsal coalitions, or SCFE, or skeletal dysplasias, for example.

Residents also benefit from a comprehensive mentoring program run by Dr. Brian Smith. Dr. Smith pairs interested residents and fellows with IPOS faculty mentors who meet with the resident and discuss a possible career in pediatric orthopaedics. This year there will be a special instructional course designed to discuss current issues relating to a career in pediatric orthopaedics. Through the generosity of Shriner's Hospital and the Pediatric Orthopaedic Society of North America and some of our industry sponsors, there are a number of tuition scholarships available for residents and fellows. Interested residents should contact Susan Pappas (Susan.Pappas@orlandohealth.com).

In summary, the International Pediatric Orthopaedic Symposium is one of the premier educational events in all of orthopaedics, and is a jewel in the crown of the Pediatric Orthopaedic Society of North America's educational offerings. This year, the course is held from Wednesday, December 2nd until Saturday, December 5th in Orlando, Florida. Interested residents are encouraged to check the POSNA website (www.posna.org) for links to registration and other information.



Jack Flynn, MD

SAVE THESE DATES...
International Pediatric Orthopaedic Symposium (IPOS)
December 2 - 6, 2009
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www.aaos.org

2010 AAOS-POSNA SPECIALTY DAY
March 13, 2010
New Orleans, Louisiana
www.aaos.org

2010 POSNA ONE DAY COURSE
May 4, 2010
ANNUAL MEETING
May 4 - 7, 2010
Waikoloa, Hawaii
www.posna.org

Changes in the Fellowship Selection and Matching Process

Scott J. Luhmann, MD & Peter Waters, MD

Starting in this September 2009, a new era for pediatric orthopaedic fellowship match process will begin. The development of a match program was mainly in response to orthopedic surgery residents' desire for a better system with more uniform application, interview and match dates. Over the past two match cycles, POSNA has modified its fellowship matching process with uniform dates and guidelines.

Simultaneous to the POSNA initiative, the AAOS has been working on the creation of an Orthopaedic Fellowship Match Program Initiative (OFMPI). Their aim was to create a federation of match programs to smooth the transition process from residency to fellowship across all orthopaedic subspecialty fellowships. Starting in 2009, all orthopaedic fellowships will be using a match process for the upcoming applicant class which will begin fellowship training in 2011. To date, almost pediatric fellowship programs in the U.S. and Canada have submitted their information and committed to participation in the SFMP match. Fellowship directors have until June 30th to submit their contracts of participation to the SFMP.

Similar to other orthopedic subspecialties, POSNA has engaged the San Francisco Match Program (SFMP) to organize and administer the match process. On September 1st, through the SFMP website applicants will be able to download the universal application

form for pediatric orthopaedics. The applicant will complete the forms and obtain the other necessary documentation indicated on the website. The goal is to have all applications into the SFMP by October 1st to optimize interview scheduling. Applications can be submitted up to the end of the interview time period (March 31st) however "the early bird gets the worm". Interviews will be conducted from January 1st through March 31st. Match lists from the applicants and the fellowship programs are due on April 15th and 1 week later (April 22nd) the match process will occur. Immediately after the match applicants who do not match will be able to contact POSNA to identify pediatric orthopaedic fellowships with unfilled positions.

Based on the now universal agreement for the match program among pediatric orthopedic fellowship directors in North America, we are optimistic few problems will occur during the match process, specifically those which have tainted previous match programs. In the event there are violations of the match agreement by the applicant or program a "Grievance committee", chaired by Baxter Willis (as second past POSNA president), will adjudicate resolution of the reported violation. Resident applicants who violate the match agreement will not be able to apply to POSNA for candidate membership for two years. Programs that violate the match will not be able to participate in the match for two years.

Dr. Matt Bueche,
continued from page 5

large dollars as our payor mix is less desirable (more Medicaid, no Workers Compensation). Of course, anyone joining will be the junior partner. In addition, a large percentage of new fellowship trainees in pediatric (orthopaedics) are women in a historically male-dominated field. This leads to what I call the Triple Jeopardy of the new pediatric orthopaedist joining a private group:

- 1) you bring in less revenue than high-volume subspecialists;
- 2) you are the junior member;
- 3) you may be the only woman in the group

This may not put you in the most powerful bargaining position. To successfully negotiate with potential employers/partners point out that: 1) we bring something new to the group— a new service line, if you will; 2) pediatric services bring good will. If a child is treated well, it will bring parents & adolescent sibs in to the other practice partners; 3) it makes all partners more efficient, taking time-consuming (to the general orthopaedist) pediatric cases off their hands, allowing them to practice in their comfort zone; 4) we raise the group's prestige and community profile; 5) we contribute by our increased availability for difficult pediatric cases, even if we are not called in every night.

Therefore, we must demand and receive some form of subsidy from the group. Straight percentages or evenly shared expenses won't cut it for true pediatric subspecialists in private practice. If potential employers can't see these points, it may be best to look elsewhere.

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