SIMULTANEOUS SLIPPED UPPER FEMORAL EPIPHYSIS IN IDENTICAL TWINS

C. P. F. ALLEN, P. T. CALVERT

The exact cause of slipped capital femoral epiphysis remains unclear. Hormonal imbalance has been suggested but has not been substantiated by a recent study (Brenkel et al 1989). A strong familial incidence has been well documented by Rennie (1982), who suggested an autosomal dominant pattern of inheritance with variable penetrance. To date only two cases have been described in identical twins and in neither was the diagnosis made simultaneously (Gorin 1977; Gajraj 1986). We report such a case.

Case report. One of a pair of 15-year-old identical twins (confirmed by blood antigen and HLA typing) presented with a five-month history of mild limp and pain in the left knee. He had been seen in an accident and emergency department on two occasions, his knee examined, radiographs taken and pronounced normal. Seven days before admission he developed more severe pain and became unable to stand on his left leg. Radiographs revealed a Grade III slip of his left upper femoral epiphysis (Fig. 1). On direct questioning it emerged that his twin brother had been dragging his right leg for approximately the same length of time but had had no pain. The parents were asked to bring this second twin to hospital immediately; a radiograph confirmed the suspected Grade I slipped upper femoral epiphysis (Fig. 2).

The Grade III slip in the first twin was treated by open reduction (Dunn 1964) and fixed with an AO screw. The less severe slip in the second twin was fixed in situ, also with a single screw. Both twins made a good recovery. At two weeks after the open reduction the hip had a full range of movement and a bone scan showed that the femoral head was viable.

Discussion. Both genetic and endocrine aetiologies have been implicated in this condition. Harris in 1950 first suggested an endocrine imbalance between growth

hormone and sex hormones to account for the weakness of the growth plate. Brenkel et al (1989), however, shed doubt on this theory as they were unable to demonstrate any hormonal imbalance in patients with slipped upper femoral epiphyses. Rennie (1982) has shown that the condition has a strong familial tendency; whereas the individual incidence was only 0.05% in the general population, 14.5% of his patients had a close relative with a slipped upper femoral epiphysis and 25% had a close relative either with this or with osteoarthritis of the hip, which can be secondary to a minor slip (Hägglund et al 1988).

Fig. 1

Fig. 2

Whatever the cause, it seems that both our twins developed slipping of their femoral epiphyses about five months prior to diagnosis. In one of the pair an acute slip was then superimposed on the previous mild one. Identical twins could be regarded as an individual with four hips. The frequency of bilaterality of slipped upper femoral epiphysis is reported as ranging between 5% and 80%, depending on the method of recording (Hägglund

C. P. F. Allen, MB ChB, Orthopaedic Senior House Officer
P. T. Calvert, MA, FRCS, Consultant Orthopaedic Surgeon
St. George's Hospital, Blackshaw Road, London SW17 0QT, England.

Correspondence to Dr C. P. F. Allen at Gisborne Hospital, Private Bag, Gisborne, New Zealand.

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0301-620X/90/5R85 \$2.00
J Bone Joint Surg [Br] 1990; 72-B:928-9.

et al 1988). Our two boys have identical genetic composition and, therefore, similar hormonal environments, but it is unlikely that their environment, in terms of hip trauma, has been identical. This case, therefore, supports the concept that individuals are genetically susceptible and that environmental factors play a much smaller role.

The HLA phenotype of the twins was A2, B12. In only one of the other two reported cases was the HLA phenotype described: in that case it was A11, B12 (Gajraj 1986). The significance of the common B12 at this stage is unclear, but further phenotype studies may be warranted.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES

- Brenkel JJ, Dias JJ, Davies TG, Iqbal SJ, Gregg PJ. Hormone status in patients with slipped capital femoral epiphysis. *J Bone Joint Surg [Br]* 1989; 71-B:33-8.
- Dunn DM. The treatment of adolescent slipping of the upper femoral epiphysis. *J Bone Joint Surg [Br]* 1964; 46-B:621-9.
- Gajraj HAR. Slipped capital femoral epiphyses in identical twins. *J Bone Joint Surg [Br]* 1986; 68-B:653-4.
- Gorin RL. Slipped capital femoral epiphyses in identical twins: report of a case. *J Am Osteopath Assoc* 1977; 77:124-8.
- Hägglund G, Hansson LI, Ordeberg G, Sandström S. Bilaterality in slipped upper femoral epiphysis. *J Bone Joint Surg [Br]* 1988; 70-B:179-81.
- Harris WR. The endocrine basis for slipping of the upper femoral epiphysis: an experimental study. *J Bone Joint Surg [Br]* 1950; 32-B:5-11.
- Rennie AM. The inheritance of slipped upper femoral epiphyses. *J Bone Joint Surg [Br]* 1982; 64-B:180-4.

FATAL AIR EMBOLISM DURING ARTHROSCOPY

J. M. GRUENWALD

Recently, a report of a fatal air embolism was published in the *Journal of Bone and Joint Surgery* (Habegger, Siebenmann and Kieser 1989). It seems possible that this was not an isolated case and that the risk of such an occurrence, especially after a recent injury, is not widely appreciated. I therefore report another such case (Grünwald, Bauer and Wruhs 1987) and note the discussion which followed its presentation at a meeting.

Case report. A girl aged 17 years injured her right knee, sustaining a fracture of the tibial eminence. In order to exclude the possibility that a torn medial meniscus was interposed at the fracture site an arthroscopy was performed, some 36 hours after the injury. The joint was washed out with Ringer's solution, but the affected area could not be seen with sufficient clarity. The joint was therefore insufflated with air, using a device similar to that employed by Habegger et al (1989). Some five minutes later there was cardiac arrest and after 45 minutes of attempted resuscitation the girl died.

At autopsy a massive air embolism was found. There seemed no way in which air could have entered the circulation other than through the fracture site. An attempt was made to simulate the arthroscopic procedure and air was found in the femoral vein.

Discussion. This case was reported at a meeting in Innsbruck, Austria, at which Habegger's case was also presented. In the discussion which followed, four surgeons recalled arthroscopies with a fatal outcome the cause of which was unclear. Two other surgeons reported acute anoxia following arthroscopy of recently injured knees; in each case the insufflation was gaseous, using air or carbon dioxide.

It seems that even when plain radiographs appear normal, there may be a trivial fracture opening into a venous sinus; through this, gas under pressure may enter the venous system. Although carbon dioxide may be tolerated better than air the danger still exists, particularly if a tourniquet is used. A sizeable volume of gas may accumulate in the venous reservoir and, when the tourniquet is released, a lethal bolus may be liberated.

Conclusion. When arthroscopy of a recently injured knee is being performed, gaseous insufflation, whether with air or carbon dioxide exposes the patient to the risk of an air embolism which may prove fatal.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES

- Grünwald J, Bauer G, Wruhs O. Tödliche Komplikation bei Arthroskopie im gasförmigen Medium. *Unfallchirurg* 1987; 90:97.
- Habegger R, Siebenmann R, Kieser CH. Lethal air embolism during arthroscopy: a case report. *J Bone Joint Surg [Br]* 1989; 71-B:314-6.

J. M. Gruenwald, Assistant Professor, Co-Director of Trauma
University of Arkansas Medical Sciences, 4301 W. Markham, Mail
Slot 531, Little Rock, Arkansas 72205-9985, USA.

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0301-620X/90/5R89 \$2.00
J Bone Joint Surg [Br] 1990; 72-B:929.