A fragmented and sclerosed capitate.

Discussion

Avascular necrosis of the capitate is a rare condition. An association has been postulated with repeated minor or a single episode of major trauma (Rahme 1983). It has also been reported in association with exposure to vibration (James and Burke 1984) and in association with dorsal instability of the carpus (Newman and Watt 1980). Bolton-Maggs et al. (1984) reported a case of bilateral avascular necrosis of the capitate and concluded that the condition was rare because an anomalous blood supply and carpal instability were required for this condition to develop.

Milliez et al. (1991) has reviewed the 19 published case reports of avascular necrosis of the capitate since its initial description by Jonsson (1942), and devised a classification system based on the site of osteonecrosis: type I with cephalic involvement, type II with involvement of the body and type III with total involvement. Our case would be a type I both radiographically and histologically, thus being the fourth, and only the second with no history of trauma.

Vander Grend et al. (1991) has described three different internal vascular patterns of the capitate, which are in keeping with the three types of osteonecrosis described by Milliez et al. The external vascular anatomy of the capitate puts it at risk of avascular necrosis, as described by Gelberman et al. (1983), since large areas are supplied by a single nutrient vessel. In two thirds of the specimens examined, the head and neck were supplied by dorsal nutrient vessels, the other 33% by palmar nutrient vessels. In only one third of cases, was there evidence of intraosseous anastomosis.

We believe that avascular necrosis of the capitate is an important, although rare, cause of spontaneous onset of wrist pain.

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Lengthening of an above-knee amputation stump with the Ilizarov technique—a case report

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A 25-year-old man sustained an open comminuted fracture of the femoral diaphysis with neuro-vascular damage in a road traffic accident. Limb salvage was attempted, but severe infection developed and after 18 months of unsuccessful treatment an above-knee (AK) amputation was performed. The resultant stump became infected. He eventually healed with a short stump. After several failed trials, the patient refused to use a prosthesis.

The stump measured 22 cm from the tip of the

During initial lengthening. At the end of the lengthening phase with initial remodeling. Final result with complete remodeling of the new regenerated bone.

greater trochanter to the distal end of the resected femur (Figure). The bone was well padded with soft tissues. There was no limitation of hip motion.

At surgery, a hybrid frame was mounted on the stump, using 3 half-pins attached to a one-third circle ring and 3 1.8 mm transfixing wires to each full ring. It was not intended to bear weight. A corticotomy was performed through a lateral incision. After 1 week, lengthening was commenced in increments of 0.25 mm, 4 times a day (Figure). A lengthening of 9 cm was achieved over 100 days. A conical shape stump resulted, without any local tenderness or limitation of hip motion. The frame was left in place for 12 months, to allow remodeling and consolidation of the newly formed bone (Figure). 1 month after removal of the fixator frame, the patient was fitted with an AK prosthesis and is now able to walk independently, without any external support.

Discussion

Thumb reconstruction has been achieved through phalanx or metacarpal lengthening (Matev 1979, 1980). Ilizarov (1990) recommended his technique to lengthen amputation stumps; lengthening of a tarsometatarsal stump has been achieved by elongation of the talus and calcaneus. The Ilizarov technique has also been used to lengthen a short below-knee stump (Eldrige et al. 1990). Bony lengthening was successful, but soft tissue problems occurred. Strickler (1994) lengthened the ulna 5 cm in a below-elbow stump. Also in this case there was impending necrosis of the adherent skin covering the tip of the lengthened bone.

Other techniques described for the lengthening of short stumps have been based on bone flaps. A composite bone flap was used to lengthen a short above- or below-knee stump (Moss et al. 1985, Younge and Dafniotis 1993). Using an implanted tissue expander in a short femoral amputation stump, 12 cm of soft tissue lengthening was achieved over a period of 4 months; when the expander was removed it was replaced with a custom-made endoprosthesis. Loosening of the endoprosthesis required exchange of the device 4 years later (Persson and Broomé 1994).

To our knowledge, reconstruction of an above-knee amputation stump using the Ilizarov technique has not been described in the western world. The Ilizarov technique is less invasive and formation of new bone, as well as elongation of covering soft tissues, can be achieved, obviating the need for future interventions. The disadvantage is the long treatment time. Although the lengthening phase is relatively short, the remodeling is time-consuming and the frame must be left in place until it is completed. It seems reasonable to leave redundant soft tissue cover in short amputation stumps in which lengthening may be expected.

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