

FAILURE OF AN ELBOW ENDOPROSTHESIS

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In a patient with a severely damaged elbow, the complication of gas gangrene could be controlled without amputating the arm. However, massive bony defects resulted in a flail elbow joint and an attempt to fit a specially designed endoprosthesis replacement failed. Four years post-injury, the flail joint was fused by three bone grafts on three separate occasions. These experiences are reported and discussed.

Key words: elbow endoprosthesis; gas gangrene; sideswipe fracture; flail joint; metal hinge joint; massive bony defect and arthrodesis.

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A specially designed hinge joint was inserted into an elbow joint which had suffered a severe crush injury and subsequently developed gas gangrene. After only one month, the procedure failed. The difficult and instructive reconstruction program is described here.

CASE REPORT

A 23-year-old male machinist, whose right elbow had been broken, was admitted to our clinic on August 19, 1965. A fetid secretion which resembled meat juice was dripping from the roughly sutured wound (Figure 1). An X-ray showed a comminuted sideswipe fracture (Watson-Jones 1960) and small gas bubbles (Figure 2). As the complication of gas gangrene was suspected, strict brushing and debridement were performed immediately with administration of antisera and antibiotics. *Clostridium welchii* was cultivated from the secretion.

After a week, a split thickness skin graft was performed on the healthy granulation wound. However, the patient's elbow had become a flail joint, due to massive bony defects, and had to be supported by a light splint. Fortunately, the gas gangrene could be controlled without amputation. Thereafter, reconstructive procedures began with a pedicle skin graft from his right chest wall on September 9, 1966.



Figure 1. Severely injured right elbow (August 19, 1965).

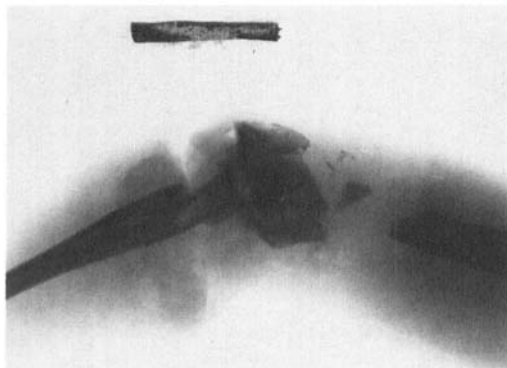


Figure 2. X-ray of right elbow (August 19, 1965).

On November 18, 1966, a specially designed hinge joint, made of chrome nickel alloy was inserted into the elbow joint (Figure 3). 22-A is an excellent stainless steel (Cr. 19–21, Ni. 21–23, Mo.1.5–2.5, C<0.1, Cu. 1.5–2.5) which was introduced by Prof. Saburo Iino and Prof. Yunoshin Imai in 1951 (Iino & Imai 1951), and has since been used clinically in Japan.

Postoperatively, the range of passive motion was from 0 to 80°. However, a hematoma and a fistula subsequently appeared and staphylococcus aureus was detected. On December 19, 1966, the metal joint appeared through the ruptured skin and had to be removed. Thus, the first attempt to reproduce a movable elbow joint had failed.

On January 27, 1967, the second attempt, involving a functional arthrodesis, was made beginning with curettage and a pedicle skin graft. During the following 3 years, three autogenous bone grafts were performed, with bone from the right fibula (Figure 4) and ilium, and from the left tibia and ilium. On February 29, 1969, when he

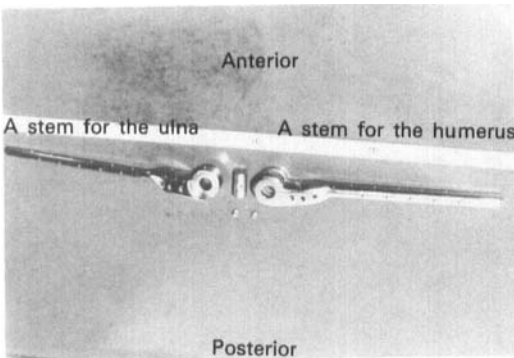


Figure 3. A specially designed hinge joint made of chrome nickel alloy (22-A).

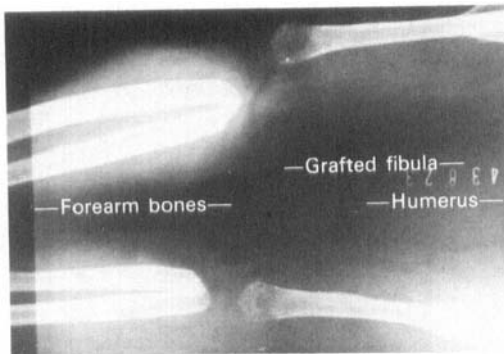


Figure 4. X-ray of the right elbow after a fibular bone graft.

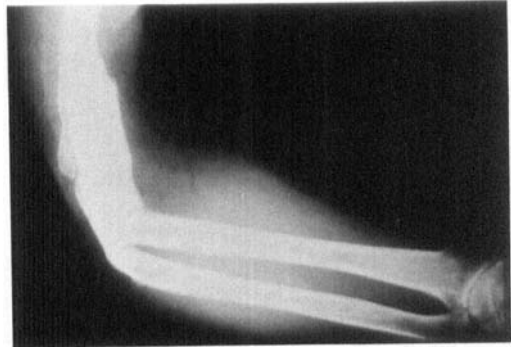


Figure 5. X-ray on August 9, 1977. The elbow had united in a functional position.



Figure 6. Making a powerful grip on August 9, 1977.

threw a snowball, his left tibia fractured and was placed in a plaster cast, which was removed after 2 months. In the meantime, the elbow had united in a functional position (Figure 5).

The patient is currently working comfortably, as before the injury (Figure 6).

DISCUSSION

Nowadays, gas gangrene is a rare complication. Only two cases with this complication have been admitted to our clinic during the past 15 years. Primary wound procedures should be strictly adhered to in order to exclude this complication.

In the case of massive bony defects, the most satisfactory results seemed to be achieved by an endoprosthetic replacement. To develop a suitable endoprosthesis of the

elbow joint, Roger Dee began a design program in London in 1968 (Dee 1976). In the case reported here, a metal hinge joint for the elbow made of chrome nickel alloy (22-A) was inserted. However, this metal joint suffered from three deficiencies: firstly, it was not designed for use with acrylic cements; secondly, its straight rod stem was torsionally unstable in the reamed bone marrow cavity; and thirdly, it was not designed to reproduce the triceps mechanism. Unfortunately, therefore, our first attempt at an elbow endoprosthesis failed.

Although the gas gangrene could be controlled, the subsequent reconstructive procedures induced a post-operative infection. These unfortunate double infections forced us

to postpone any further reconstructive procedures for 4 years.

However, the patient is at present working comfortably.

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