Treatment of Complications in Intercalary and Terminal Allografts

P. Hernigou, G. Delepine, P. Romano, and D. Goutallier

There are many reports in the literature on the operative procedures and clinical results of allogeneic bone grafts; however, only a few reports [1, 3, 4, 7] have discussed treatment of the associated complications, when they occur.

In our experience, failure of bone allografts is due to infection, fracture, or both. In an attempt to analyze the various treatments and protocols that were used when the intercalary and terminal allograft failures occurred, we reviewed the cases of 14 patients with such complications.

Materials

From 1984 to 1987, 36 massive allografts obtained from the bone bank at the Henri Mondor Hospital were transplanted for replacement of segmental diaphyseal defects. There were 24 intercalary allografts or, for resections about joints, 12 terminal (or osteoarticular) allografts.

All the grafts had the same preparation. They were removed from selected donors (victims of trauma) and placed in a freezer at $-35^\circ$C; all were sterilized with beta rays and the dose of irradiation was about 250 Gy [2].

The allografts were performed for the management of 22 tumors [5] requiring adjuvant treatment (chemotherapy and/or radiotherapy) and 14 tumors requiring no adjuvant treatment [6]. The actual follow-up time averaged 3.5 years (range 2–5 years).

Among the 36 patients, the following complications were observed and divided into four groups for purposes of analysis and discussion:

- Group I (3 patients): infected non-union
- Group II (5 patients): non-infected non-union
- Group III (3 patients): fractures of the diaphyseal part of the graft
- Group IV (3 patients): non-traumatic fractures of the epiphyseal part of the graft

Hôpital Henri Mondor, 94010 Creteil, France
Treatment of These Complications

**Group I:** The three infected non-unions occurred in patients who received adjuvant treatment (both chemotherapy and radiotherapy) after these grafts. Infection occurred early following breakdown of the skin over the graft (tibia). At first, we did not use flap grafts for the skin; instead, the protocol was administration of appropriate antibiotics in combination with drainage of the wound without removing the bone allograft. Due to the poor tolerance of the infection and the necessity of continuing chemotherapy, we were unable to obtain union and the three patients’ infected limbs had to be amputated.

**Group II:** Non-infected, non-union occurred in two patients not receiving chemotherapy and in 3 patients receiving adjuvant chemotherapy. The former had supplemental autografts packed around the host-allograft junction (humerus) at an average of 6 months before failure of the osteosynthesis; union occurred 3 months after the graft in these two patients. The latter three patients also had supplemental autografts; one had union with the autograft (around the tibia) during the time of chemotherapy; another, despite the autograft (around the inferior femur), had non-union and failure of the osteosynthesis. This complication was managed by removal of the allograft and insertion of another allograft, with autogenous bone graft being packed in at the same time in the host-graft junction; union occurred after more than 1 year, i.e., after the end of chemotherapy; the third patient also had non-union, despite the graft, but had an acceptably functional humerus.

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**Fig. 1.** Non-union of the superior extremity of the tibia  
**Fig. 2.** Non-traumatic fragmentation of the epiphyseal part of the graft