



Figure 2: Operative setting of the da Vinci Surgical system used for harvesting the left internal mammaria artery (LIMA) in skeletonized fashion.

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Pathologic femur fractures following limb-salvage surgery and radiotherapy for soft tissue sarcomas: They don't heal!

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Introduction: Combined limb-sparing surgery and radiation therapy are considered the standard of care for soft tissue sarcomas (STS) of the extremities. The correlation between radiation therapy and the risk of post radiation fracture is known but underestimated and can end up in serious long-term complications.

Case description: We reviewed the records of 3 patients with pathological femur fracture years after wide local excision of a STS of the proximal lower extremity with postoperative radiation therapy. All patients received more than 50 Gray to the entire femur circumference. No one received perioperative chemotherapy. During surgery, all patients had bone exposure, whereas only one patient had the periosteum stripped.

Results and Conclusions: Two patients were female and one male. The median time from surgery/radiation to fracture was 116 months (range, 84 to 156 months). The median age at the time of diagnosis was 66 years (range, 54 to 79 years). All fractures occurred within the radiation treatment field. Two fractures occurred after minimal or no trauma, one fracture occurred after a mountain bike fall. All three fractures 3/3 (100%) developed a non-union. One patient died due to uncontrolled pulmonary metastasis and local recurrent disease. In the second case we had to perform an exarticulation at hip level due to an uncontrolled infected non-union with soft tissue defect despite several surgical revisions. The third patient is still under treatment of his non-union.

Take home message: Local control rates after combined therapy for the treatment of soft-tissue sarcomas are high. However, pathologic fractures after radiation therapy pose an extreme challenge in their treatment and may be associated with long-term complications that can cause physical disability and impairment of the quality of life.

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Non-union of paediatric carpal fractures: A case report and current concepts review

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Introduction: Paediatric carpal bone fractures are rare, and usually secondary to significant direct trauma. Diagnosis can commonly be missed or the significance of the injury not completely recognised on presentation. During development, the ossification centre of each individual carpal bone is surrounded by a spherical growth plate. This acts as a protective barrier against injury. As the child reaches adolescence the critical bone-to-cartilage ratio is reached, and so, carpal bone fractures start to become more common.

Case description: A 12 year-old boy presented to the emergency department with right wrist pain following a fall from his bicycle while travelling at speed. The impact was sustained directly on to an outstretched hand, resulting in a closed injury. Radiographs demonstrated a dorsally displaced Salter-Harris III fracture of the distal radius with associated displaced fractures of the ulna styloid and lunate. The patient reported reduced sensation and tingling in the thumb, index and radial aspect of middle finger consistent with the distribution of the median nerve. Motor supply was intact. The fracture was initially mobilised with a dorsal plaster slab. The patient was taken to theatre the following morning for manipulation under anaesthetic and plaster immobilisation. Satisfactory reduction of the distal radius fracture was achieved with the lunate and ulnar styloid fractures not addressed. Median nerve symptoms improved somewhat following the procedure but did not completely resolve. At 10 days post-operatively check radiographs demonstrated the distal radius fracture reduction to be maintained and the plaster cast was changed to a lightweight below elbow full cast which remained in situ for 6 weeks. Radiographs at 6 weeks demonstrated union of the distal radius fracture but no signs of healing of the ulnar styloid or lunate fractures. Median nerve sensory symptoms had improved. The cast was removed and range of motion exercises begun. An MRI was performed showing a non-united fracture of the lunate without signs of avascular necrosis. The patient is now 6 months post-op and currently asymptomatic with a full painless range of motion. He has returned to his pre-morbid level of function being actively involved in physical education at school and reports no pain in the wrist or functional deficit. Radiographs continue to demonstrate a lunate non-union.

Results and Conclusions: Paediatric lunate fractures are very rare, and as a result there is very little published literature available. Previous case reports have demonstrated good long-term results from both conservative and operative management of paediatric carpal fractures. A case report by Bhatnagar et al. highlighted a good clinical outcome with non-operative treatment of an active 11-year old boy with multiple carpal fractures. They demonstrated asymptomatic full range of motion of the wrist at 3 years follow-up, despite CT at this stage showing non-union of a hamate fracture. Similarly, there have been good clinical outcomes with operative management. Kamano et al. showed effective results in a child with multiple carpal fractures treated with wire fixation followed to twenty-nine months. In 2009, Foley et al. also demonstrated similar outcomes in a 10-year old boy treated with Kirschner wires. In this patient, bone union was achieved and there was pain free full range of movement of the wrist at 1 year follow-up.

In our case, we pursued a conservative approach to management based solely on the patient's symptoms. The questions that however remain are:

- whether this lunate fracture may progress to a delayed union and should we thus follow up the patient until this occurs?
- if union does not occur will this result in long term detriment to wrist function or chronic pain?
- should a delayed ORIF with bone grafting be performed simply to achieve union or should it be performed only in the presence of symptoms?