Endoprosthetic Replacement of Segmental Skeletal Defects

After Ostesarcoma Resections

Osteosarcoma (OS) is the most common primary malignant bone tumor, occurring mainly in children and adolescents, and the limbs are the main affected sites. Limb salvage surgery has been globally accepted treatment of osteosarcoma in the last few decades. Effective neoadjuvant chemotherapy and improved understanding of tumor biology increased the indications of limb salvage surgery in OS. The contraindications for limb salvage in OS are poorly placed biopsy incisions, major neurovascular involvement, displaced pathologic fracture, major infection, recurrence and poor general conditions.

Endoprostheses have achieved the rising acceptance among orthopaedic oncology surgeons. Endoprosthetic replacement of segmental skeletal defects is the desired technique of reconstruction after resection of osteosarcoma. Endoprosthetic reconstructions are performed for proximal femur, distal femur, total femur, proximal tibia, proximal humerus and scapula. It is rarely carried out for pelvis, distal humerus, kalkaneus. The advances including prosthetic design (moduler components), manufacturing (3D modelling, bioprinting, material) and surgical techniques (muscle fleps, robotic surgery) are increased its range of applicability.

The objectives of extremity reconstruction after osteosarcoma resections include providing essential skeletal stability, adequate wound coverage to allow the application of adjuvant chemotherapy. The aesthetic outcome and preservation of functional capability by means of early return to function are the goals of the treatment. Apart from the benefits of endoprosthetic reconstructions, aseptic loosening, stem fracture, infection, dislocation are the problems still needed to face off. The incidence rate of aseptic loosening is 5%–11%. Hydroxyapatite(HA) coated stem for osseointegration, anatomically curved stems for long pressfit anchorage, rotating hinge prothesis for decreasing stem rotation stress, early repair of worn polyethylene bushings, new cementation techniques for stable fixation are the solutions for decreasing the rate of aseptic necrosis by means of achieving good medullary press fit stem anchorage and excellent secondary osseointegration. Key point is to limit rotational stress transmitted to stem. Infection is the most serious complication in tumor prothesis. The rate of infection is 8%–10% that is found to be low in upper extremity beside high in lower extremity. Once infection occurred, the amputation rate was also increased. We hope to reduce infection rate in the future with new antimicrobial agents and prosthesis coatings, better soft tissue coverage, postop. negative pressure drains, more anatomic and smaller prosthesis designs, antibiotic embedded cementation. Dislocation is common after proximal and total femur prothesis. Reconstruction of joint capsule, reattachment of residual muscles especially abductor mechanism have crucial role for avoiding from dislocation of endoprothetic reconstruction. Bipolar cups can be suggested despite of classic designs.

Functional evaluation is performed with the Musculoskeletal Tumor Society (MSTS) efficacy scoring system for limb-salvage surgery. MSTS for endoprosthesis are affected multifactorially however the mean scores shows that endoprostheses increase the quality of life of patients.