Editorial

Osteosarcoma: A journey from amputation to limb salvage

If we go around 40 years back, osteosarcoma was synonymous with amputation of limb and was feared with death of the patient. Before 1970, amputation was the sole treatment for a high grade osteosarcoma and 80% of patients would die due to lung metastasis[1] even after amputation. These tumors are very aggressive in their nature;[2] hence, most of the surgeons considered amputation as the answer to halt its aggressiveness. The psychological trauma of amputation and fear of the disease leads to dual mental trauma to the patient. However, science keeps on progressing through research for betterment of mankind. Over the last four and half decades, the world has seen the journey of osteosarcoma from amputation to limb salvage and long term survival rate has risen up to 80% with localized disease.[1,3] Limb salvage refers to successful to safe margin resection of a tumor and reconstruction of a viable, functional extremity.[1]

This all has occurred because of improvements mainly in multimodal chemotherapy improved imaging investigations, improved histopathological techniques such as various tumor markers, molecular studies of tumor, surgical technique improvements (better skeletal reconstruction after tumor resection), advances in bioengineering, and endoprothesis. Implant designs, osteoarticular allografts, allograft prosthetic composites, expandable prosthesis, vascularized grafts, and arthrodesis and rotation plasty.

Osteosarcoma is the most common highly malignant, primary tumor of bone. The incidence of classic osteosarcoma in 3 cases/million population/year and represents 0.2% of all malignant tumors.[4]

Osteosarcoma is a systemic disease. Better understanding of tumor biology and metastasis is essential for overall survival. Molecular techniques analyze the cellular pathways responsible for osteosarcoma carcinogenesis and has helped in identifying prognostic and therapeutic markers. This is very well expressed in one of the review articles in this issue (Wadhwa *et al.*).[5] If we succeed in developing target chemotherapy to osteosarcoma cells and micrometastatic foci, it will make long term survival a possibility.

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Advances in chemotherapy in past four decades are mainly responsible for reduction in pulmonary metastasis and improved limb salvage. Modern multiagent dose intensive chemotherapy adjuvant regimens have resulted in the long term disease-free survival rates of approximately 60-80% in patients who present with localized disease (nonmetastatic).[1] Neo-adjuvant chemotherapy has improved limb salvage. It sterilizes the reactive zone around the tumor by destroying microscopic disease at the periphery of the primary lesion and facilitating safe resection[3] 8-12 weeks of preoperative neo-adjuvant chemotherapy is recommended.[3]

The improvements in prosthesis offer limb salvage. The light weight, strong, inert material, modular prosthesis have improved functional outcome by early weight bearing and early joint range of motion. Magnetic resonance imaging, computed tomography (CT) chest and local area and positron emission tomography-CT help to decide surgical resection and improves surgical decisions. Preoperative Tru-cut biopsy with markers decides prognosis. The molecular biology of cells helps to improve the chemotherapy agents leading to further improvement in survival rate. Frozen allografts are used as reconstruction option. The vascularized fibular graft is suited for children and young adults. Allograft prosthetic composite helps reconstruct larger gaps and provides functional limb. Thus, it avoids amputation. Even arthrodesis after surgical resection or rotation plasty after surgical resection helps to prevent mental trauma of amputation.

If we compare limb sparing and amputation surgery with available recent advances in terms of local recurrence, survival and functional outcome, it is comparable with amputation.

Thus, there is a lot of change in the treatment to this sinister, malignant tumor. Educating the patient and his relatives about this malignancy will psychologically improve any fear the patient perceives.

This issue brings the latest articles (review and original), which highlight osteosarcoma. These articles touch all the latest issues including classification, safe biopsy methods, histopathology

markers, molecular biology for prognostication. This issue also has original series with followups in single centers, the unusual surface types of osteosarcomas[6] and management of difficult pelvic osteosarcomas.[7] The treatment of highly malignant osteosarcoma is still a challenge to medical science. An ideal situation in the treatment of osteosarcoma is when the tumor can be eradicated without an amputation, bone/soft tissue loss with near normal function.[2] The fields which still require improvement are target chemotherapy, improved bioengineering and megaprosthesis, improvement in surgical techniques like enhanced tendon encourage devices of prosthesis.

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