Case Report

A Case of Rapidly Growing Osteosarcoma of the Rib

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A 37-year-old woman noticed a right anterior chest mass and pain. The mass had been rapidly growing and she visited our hospital. The mass was hard and 8 × 7 cm in size. It was detected in the upper inner quadrant of her anterior chest wall. A computed tomography (CT) examination and magnetic resonance imaging (MRI) of the chest revealed a large heterogeneously enhanced mass arising from the right chest wall with lytic destruction of the rib and coarse calcification. An image diagnosis of osteogenic sarcoma originating from a rib was made. She underwent surgical excision of the tumor and chest wall reconstruction. Microscopic examination of the resected tumor showed multiple neoplastic cells accompanied by osteoid formation within the tumor. The tumor was diagnosed as high-grade malignant osteosarcoma of the rib. Primary osteosarcoma commonly originates in the long bone in children and adolescents, but it occurs very rarely in the ribs in adults. Surgical resection plays an important role in the treatment for this disease. We report a case of primary osteosarcoma that originated in the rib of a young woman and was treated successfully by surgery.

Keywords: osteosarcoma, rib, chest wall tumor

Introduction

Primary osteosarcoma commonly originates in the long bone in children and adolescents, but it occurs very rarely in the ribs in adults.1-3) Surgical resection plays an important role in the treatment for this disease.4,5) During surgery, wide en-bloc resection with tumor-free margins and chest wall reconstruction are necessary. In addition, the maintenance of chest stability to prevent respiratory problems and an acceptable cosmetic result may be required in chest wall reconstruction.6,7) We report a case of primary osteosarcoma that originated in the rib of a young woman and was treated successfully by surgery.

Case Report

In May 2011, a 37-year-old woman noticed a right anterior chest mass and pain. The mass had been rapidly growing for the past 2 months and she visited our hospital in March 2012. There was no history of illness or trauma. The mass was hard and 8 × 7 cm in size. It was detected in the upper inner quadrant of her anterior chest wall. A chest radiograph showed an oval mass in the right chest (Fig. 1A). A computed tomography (CT) examination of the chest revealed a large heterogeneously enhanced mass arising from the right chest wall with lytic destruction of the rib and coarse calcification (Fig. 1B). Magnetic resonance imaging (MRI) of the chest was also done to evaluate the mass itself and the existence of direct invasion of surrounding organs. Direct invasion of...
the right lung was suspected. An image diagnosis of osteogenic sarcoma originating from a rib was made. It is noteworthy that the mass showed rapid growth and increased to $12 \times 10$ cm within 1 month after her first visit. Though the necessity of biopsy to make a definite diagnosis for treatment was explained to the patient, she rejected it due to the risk of implantation of tumor cells into the mammary gland.

In spite of the lack of a definite preoperative diagnosis, we decided to perform surgical excision of the tumor because malignancy of the tumor was strongly suspected on the basis of images and clinical findings and because the tumor had been growing rapidly. The patient was a young woman and she strongly hoped to preserve her mammary gland. There was no evidence of direct invasion of the mammary gland from the imaging findings and preservation of the mammary gland was considered to be possible in our preoperative decision.

Surgery was performed in June 2011. At first, the mammary gland was resected from the pectoralis major muscle and a flap was made (Fig. 2A). There was no evidence of direct invasion of the mammary gland or exposure of the tumor from the pectoralis major muscle. The tumor arose from the anterolateral joint of the third rib, involving the second and fourth ribs, and invaded the right upper lung. From the second to the fourth right rib, the pectoralis major muscle and the smaller pectoral muscle were resected en-bloc. In addition, partial resection of the right upper lobe was also performed. An intraoperative pathological examination was carried out and a negative surgical margin was confirmed. The defect of the right chest wall was $19.5 \times 10$ cm in size and chest wall reconstruction was done with polytetrafluoroethylene sheets.
A Case of Osteosarcoma of the Rib

No cases of osteosarcoma were reported in a large study comprising 49 cases of primary malignant chest wall tumors. Therefore, we considered our case of primary osteosarcoma that occurred in the rib in a young woman as extremely rare.

There are no characteristic symptoms and radiological features of osteosarcoma in ribs. Therefore, it is very difficult to diagnose osteosarcoma from these findings. Biopsy and histopathological evaluation of the tumor are necessary to make a definite diagnosis. In some cases, biopsy is discouraged because there may be a risk of implantation of tumor tissue into the soft tissues or skin through biopsy procedures. In our case, the patient, a young woman, strongly hoped to preserve the mammary gland and biopsy of the tumor was not performed because of the risk of tumor cell implantation into the mammary gland. Hence, she underwent surgical excision of the tumor and received adjuvant chemotherapy. If the preoperative definite diagnosis of osteosarcoma is established, neoadjuvant chemotherapy might become one of the alternatives for treatment.

In the treatment of malignant chest wall tumors, surgical resection of the tumor plays an important part. Wide en-bloc resection with tumor-free margins is necessary in cases of malignant chest wall tumors in order to minimize local recurrence and to improve long-term survival. If possible, an intraoperative pathological examination should be carried out. In addition, chest wall reconstruction may be important. Maintenance of chest stability to prevent paradoxical respiratory movements or postoperative ventilatory support and an acceptable cosmetic result may be required in the procedure. We considered the treatment of this case a success because the patient recovered well from the surgery without severe respiratory problems and because she was quite satisfied with the preserved mammary gland.

Osteosarcomas are usually high-grade malignant tumors and their prognosis is poor. The 5-year survival in patients with primary osteosarcoma has been reported to be about 20% in spite of combination treatment with chemotherapy and surgical resection. In our case, though there is no evidence of tumor recurrence at present, a strict follow-up is necessary.

Discussion

Malignant chest wall tumors are rare. Osteosarcoma, commonly originating in the long bone in children and adolescents, occurs rarely as primary tumor in the ribs. Polytetrafluoroethylene sheets (Gore-Tex sheets) were used for chest wall reconstruction. The resected tumor was 11 × 9 × 7 cm in size. Microscopic examination showed multiple neoplastic cells accompanied by osteoid formation within the tumor. The tumor was diagnosed as high-grade malignant osteosarcoma of the rib. The patient recovered well from the surgery without severe respiratory problems. She underwent adjuvant chemotherapy with adriamycin and cisplatin. There was no evidence of tumor recurrence and the patient remained well 11 months after surgery.

Conclusion

Primary osteosarcoma in the rib in young women is extremely rare. In the treatment of this disease, surgery plays a very important role. We successfully performed chest wall reconstruction with polytetrafluoroethylene sheets (Gore-Tex sheets) (Fig. 2B). The resected tumor was 11 × 9 × 7 cm in size (Fig. 3A). Microscopic examination showed multiple neoplastic cells accompanied by osteoid formation within the tumor (Fig. 3B). The tumor was diagnosed as high-grade malignant osteosarcoma of the rib. The patient recovered well from the surgery without severe respiratory problems.

Fig. 3  (A) The resected tumor was 11 × 9 × 7 cm in size. (B) Microscopic examination showed multiple neoplastic cells accompanied by osteoid formation within the tumor. The tumor was diagnosed as high-grade malignant osteosarcoma of the rib (H.E. stain × 200).
wide resection of the tumor and chest wall reconstruction with preservation of the mammary gland.

Disclosure Statement

The authors declare that they have no conflict of interests.

References