

Repair of the Wall Chest Using the Neocote Technique of a Huge Chondrosarcoma

Khalil Ghebouli^{1,2*}, Amar Djender¹, Kenza Bendjoudi², Bachir belbachir¹, Mehdi belbekri¹, Mohammed amine kecir¹

¹Department of Cardiovascular Thoracic Surgery and Organ Transplantation University Hospital Mustapha Algiers, Algeria

²Department of Anesthesia University Hospital Mustapha Algiers, Algeria

³Department of Thoracic Surgery University Hospital Constantine, Algeria

DOI: [10.36347/sjmcr.2024.v12i02.018](https://doi.org/10.36347/sjmcr.2024.v12i02.018)

| Received: 11.01.2023 | Accepted: 18.02.2024 | Published: 21.02.2024

*Corresponding author: Khalil Ghebouli

Department of Cardiovascular Thoracic Surgery and Organ Transplantation University Hospital Mustapha Algiers, Algeria

Abstract

Case Report

Chondrosarcoma represents the most common malignant bone tumor, its prognosis is quite good provided that the surgical excision is wide because the evolution is loco-regional, metastases are only observed in tumors of high malignancy or during recurrences. A wide excision implies a significant parietal defect, a source of complications, justifying the need for reconstruction. The principle of the neocote technique is to attempt to reconstruct a solid wall, as anatomically as possible. The main advantages of this original technique are respect for the anatomy of the chest and the mobility of the wall, respiratory function is therefore better preserved. We report a case of a patient operated on for a huge rib chondrosarcoma and who benefited from repair using the neocote technique.

Keywords: Chondrosarcoma, chest wall, repair, neocote.

Copyright © 2024 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Chest wall tumors constitute a group of heterogeneous conditions having as their only common point the fact of being localized in the bony or soft part of the chest wall. This is a therapeutic challenge whose hinge remains surgery.

The prognosis is quite good provided that the surgical excision is wide because the evolution is loco-regional, metastases are only observed in tumors of high malignancy or during recurrences.

A wide excision implies a significant parietal defect, which affects the patient's respiratory function and justifies reconstruction using an adequate technique.

The beginnings of reconstruction were the work of Volger who, in the same year (1898), used an osteoperiosteal flap. Indeed, all these interventions involved neighboring tissues (periosteum, muscles, abdominal or thoracic tissue flaps). It was only in 1909 that the first metal wall prostheses appeared, the results of which were not very encouraging [1].

It was not until the 1940s that synthetic materials were better tolerated and easier to use. Chondrosarcoma is the most common malignant bone tumor and develops at the expense of the chondrocostal

junction (60%) of the sternum (20%) or the rib neck (20%) [2].

Slow growing, chondrosarcoma usually affects people aged 30 to 60 in the form of a large tumor of the sternocostal plastron, silent for a long time then painful, sometimes complicated by signs of nervous or respiratory compression [3].

Its treatment is essentially surgical, obeying three rules: namely oncological excision, reconstruction and recovery.

Indeed, a complete and satisfactory resection from the oncologist's point of view leads to parietal instability responsible for paradoxical breathing observed in the thoracic flaps, likewise the orifice of the parietectomy leads to pulmonary hernia or the passage from outside to inside of the parietal muscles [1].

Wall repair is essential; several techniques have been described using biological or synthetic materials. We report the case of a patient operated on for chondrosarcoma and who benefited from parietal repair using the neocote technique.

The principle of the technique is to attempt "using pins and synthetic cement" to reconstruct a solid

wall, as anatomically as possible, so as to preserve the physiological mobility of the wall.

did not consult in time until the mass increased in volume.

CASE REPORT

A 34-year-old male patient consulted for swelling of the anterior chest wall. The clinical history begins three years ago; through negligence, the patient

The physical examination reveals a large mass of the chondrosternal plastron, poorly defined, polylobed, of firm consistency and not very mobile (Figure 1).

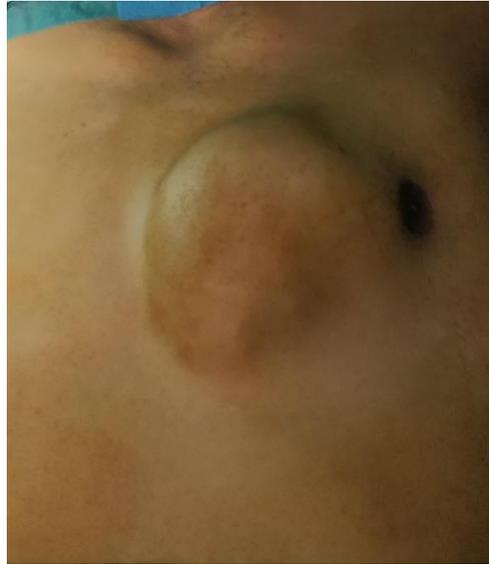


Figure 1: Clinical appearance of the tumor (K. Ghebouli Collection)

X-ray images of the chest with lateral views are often of great help. The contribution of chest CT, with especially reconstructions, is essential for a good delineation of the tumor as well as its relationships with

adjacent structures. Radiologically, the tumor presented itself in the form of a tumor image which is not very dense, polylobed, calcified with an adjacent bone cortex destroyed (Figure 2, 3, 4).

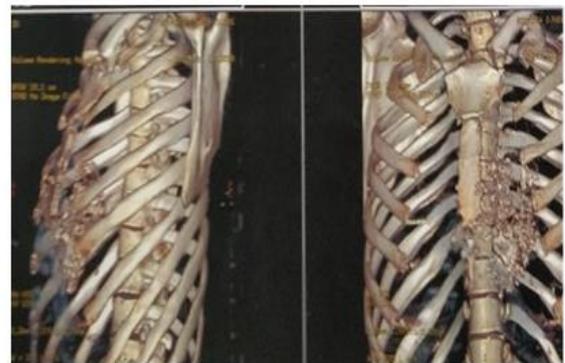
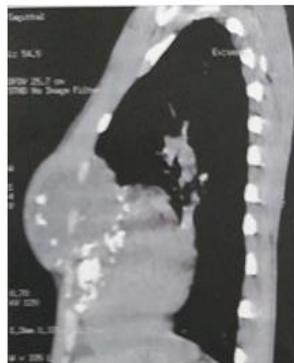


Figure 2, 3, 4: Scannographic appearance of the mass, presence of calcification confirming its osteo-cartilaginous nature (K. Ghebouli Collection)

Finally, the preoperative biopsy is the key to judging the malignant or benign, primary or metastatic nature of the tumor. This confirmed the diagnosis of chondrosarcoma. The biological examinations did not show any abnormalities, the EFR was correct.

Surgical Technique:

The patient was approached under general anesthesia through an incision directly above the lesion,

in the direction of the intercostal space and the affected rib (Figure 5).

First surgical stage excision of the mass: after preservation of the pectoralis major muscle, the adjacent costal cartilages are resected as well as the above and underlying ribs are also resected (Figure 6).

Given the endo-thoracic extension, the pleura appears macroscopically to be infiltrated and its

resection was carried out. The pericardium was healthy as was the lung.

Second surgical step repair: After resection of the surgical piece, the edges of the remaining rib fragments are made anfractuans using rongeurs. Then pins are inserted into the medulla of the ribs (Figure 7). The silicone sheath is slipped over the rib and pin assembly, and sealed on the rib by a simple ligature at its two ends. Liquid phase methylmethacrylate is injected into the sheath, and when polymerization is complete, the mold is sectioned and removed. An artificial rib therefore

remains in place, firmly attached to the skeletal wall (Figure 8).

Third surgical step recovery and closure: the parietectomy orifice was covered by a bifacial plate and reinforced by plasty of the pectoralis major muscle to isolate the prosthetic material from the surface.

After drainage, the skin is closed with an overlock with a compressive dressing in order to avoid peri-prosthetic collections, a source of infection (Figure 9, 10, 11).



Figure 5: Incision directly above the tumor (K. Ghebouli Collection)



Figure 6: Excision of the tumor (K. Ghebouli Collection)



Figure 7: Fixation de broches (Collection K. Ghebouli)



Figure 8: Creation of artificial ribs (K. Ghebouli Collection)



Figure 9, 10, 11: Installation of a two-sided plate and closure after plasty using the pectoralis major muscle (K. Ghebouli Collection)

The pathological study of the surgical specimen confirmed the diagnosis of chondrosarcoma, the immediate and long-term evolution was favorable.

DISCUSSION

Surgery for chondrosarcomas is the best therapeutic option in the majority of cases because it constitutes the only curative treatment of the disease and the pain; for this, a preoperative assessment is essential to establish the indication and prepare for reconstruction [4-6].

The incision directly above the tumor while allowing oncological resection is preferred to a thoracotomy and the preservation of healthy intermediate planes so as not to compromise coverage [7]. After tumor resection, and in the event of a significant parietal defect, repair is necessary.

Most of the time, the choice of material depends on the surgeon's preferences. Studies have shown the absence of significant difference between the different

materials in post-operative outcomes and possible complications [8].

We favored the neocote technique because it can be placed at all levels of the costal arch, the pins can be easily inserted into the sternum.

The main advantages are respect for the anatomy of the thorax and the mobility of the wall. Respiratory function is therefore better preserved. The risk of periprosthetic seroma is also lower due to a very limited synthetic surface. Finally, the duration of postoperative drainage is not increased, and pleural complications are not more frequent than with traditional parietal repair techniques.

The main risk remains infection of the equipment. Disassembly is rare in the absence of technical faults [9].

CONCLUSION

Surgery is the best choice in the management of chondrosarcomas provided that it is carcinological. An

appropriate choice of tumor excision and reconstruction techniques, this remains crucial in order to avoid complications linked to enlarged excision.

Due to these advantages, and in our opinion, the neocôte technique constitutes a very interesting technique.

REFERENCES

1. Dahan, M., Brouchet, L., Berjaud, J., & Garcia, O. (2003). Chirurgie des tumeurs de la paroi thoracique. *Annales de chirurgie plastique esthétique*, 48, 93–98. DOI: 10.1016/S0294-1260(03)00012-8.
2. Brouchet, L., Ballouhey, Q., Brouchet, A., Giron, J., Berjaud, J., Renaud, C., Benouaich V., & Dahan, M. (2010). Tumeurs primitives de la paroi thoracique. EMC (Elsevier Masson SAS, Paris), Pneumologie, 6-002-G-69.
3. McAfee, M. K., Pairolero, P. C., Bergstralh, E. J., Piehler, J. M., Unni, K. K., McLeod, R. A., ... & Payne, W. S. (1985). Chondrosarcoma of the chest wall: factors affecting survival. *The Annals of thoracic surgery*, 40(6), 535-541.
4. Eschapaspe, H., Gaillard, J., Henry, F., Fournial, G., Berthoumieu, F., & Desrez, X. (1981). Repair of large chest wall defects: experience with 23 patients. *The Annals of Thoracic Surgery*, 32(4), 329-336.
5. Pairolero, P. C., & Arnold, P. G. (1981). Chest wall reconstruction. *Ann Thorac Surg*, 32, 325–326.
6. Mathes, S. J. (1995). Chest wall reconstruction. *Clin Plast Surg*, 22, 187-198.
7. Icard, P., Magdeleinat, P., Regnard, J. F., & Levasseur, P. (1998). Pariéctomies pour tumeurs. *Encycl Méd Chir* (Elsevier SAS, Paris), Techniques chirurgicales - Thorax, 42-475, 10p.
8. Deschamps, C., Tirnaksiz, B. M., Darbandi, R., Trastek, V. F., Allen, M. S., Miller, D. L., ... & Pairolero, P. C. (1999). Early and long-term results of prosthetic chest wall reconstruction. *The Journal of thoracic and cardiovascular surgery*, 117(3), 588-592.
9. Marcheix, B., Brouchet, L., Berjaud, J., Renaud, C., Giron, J., Gomez, A., & Dahan, M. (2005). Techniques de réparation de la paroi thoracique. EMC (Elsevier SAS, Paris), Techniques chirurgicales - Thorax, 42-472.