Extended cervico-thoracic metastasectomy for testicular non-seminomatous germ cell tumour masses through an inverse T and combined collar incision

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Abstract

Non-seminomatous germ cell tumours (NSGCT) are the most common malignancy from testicular origin in young males. They are characterized by early formation of metastases along retroperitoneal and subsequent mediastinal lymph node stations. Following cisplatin-based induction chemotherapy, residual tumour masses should be removed surgically, although this implies the need for extended procedures. Such an approach can result in cure rates of over 70%. Herein, we report 2 cases of maximally extended surgery for metastatic malignant germ cell tumour of the testis. In both patients, diagnostic work-up revealed a NSGCT with retroperitoneal, mediastinal and cervical lymph node metastases. Multimodal protocols including induction chemotherapy and surgical removal of all primary and secondary tumour masses with curative intent were applied. An 'inverse T' incision in combination with a collar incision was chosen to approach the excessive supra-diaphragmatic tumour spread. This large-scaled surgical access offered an excellent exposure and allowed complete resection of all cervical and thoracic metastases in both patients. Abdominal tumour masses were resected through a standard median laparotomy. These 2 cases illustrate that complete tumour resection is feasible even in stages of NSGCT with generalized lymphatic spread. Metastasectomy should be offered to NSGCT patients despite the necessity of extended surgical approaches.

Keywords: Metastasectomy • Germ cell tumour • Inverse T incision

CLINICAL CASES

Case I

A 27-year old male patient was referred to our institution for metastasectomy of enlarged retroperitoneal, mediastinal and cervical lymph nodes. Two years before, the patient underwent orchectomy for an embryonic carcinoma of the testis [pT1 Nx Mx R0; (alpha-fetoprotein (AFP) 159 IU/ml (normal: <5.8 IU/ml), human chorionic gonadotropin (HCG) 232 U/l (normal: <2 U/l)]. At that time, the patient refused the evaluation of already enlarged cervical lymph nodes. The germ cell-associated tumour markers were elevated in the laboratory examination (AFP 660 IU/ml, beta HCG 1478 U/l). However, the tumour expansion further proceeded resulting in compression of the superior vena cava and innominate veins. Thus, the decision was made for a sequential cervico-thoracic and retroperitoneal metastasectomy (Fig. 1B). A combination of an ‘inverse T’ and a collar incision was chosen in order to allow an optimal exposure of all cervical and supra-diaphragmatic metastases [1]. Cervical and mediastinal tumour bulks were mobilized on both sides towards their caudal end, including tumour portions in the paravertebral sulcus. The patient was extubated on the operation table and transferred to the intensive care unit for one night of postoperative surveillance. In a second operation, the infra-diaphragmatic tumour portions were resected. Although most of the tumour bulks were removed, resection margins remained positive in the region of left renal hilum due to the infiltrative growth of the metastases (intraoperative R2). All resected metastases consisted of mature teratoma. At present, 8 years after the diagnosis of the primary tumour, the patient is alive and well, but with recurrent tumour.

Case II

A 20-year old male patient was sent to our institution for the diagnostic work-up of recently detected enlarged cervical lymph nodes. The germ cell-associated tumour markers were elevated in the laboratory examination (AFP 660 IU/ml, beta HCG 1478 U/l).
Histology of a biopsied lymph node showed a mixed type non-seminomatous germ cell tumour (NSGCT). ¹⁸F-Fluorodeoxyglucose positron emission tomography-computed tomography (PET-CT) imaging revealed a tracer uptake in the left testis with metastatic spread to retroperitoneal, posterior mediastinal and cervical lymph nodes [cT2 N3 M1a (stage IIIB)]. In a first step, the patient underwent inguinal orchiectomy with four cycles of adjuvant BEP chemotherapy. Restaging after chemotherapy revealed a biological response with normalized tumour markers (AFP 3.8 IU/ml, beta HCG 0.3 U/l). However, a CT scan showed no morphological response (Fig. 2). The patient was referred to surgery for staged resection of all residual tumour masses. In a first procedure, complete removal of all retroperitoneal lymph node metastases could be achieved. One month later, the excessive cervical and intrathoracic lymph node secondaries were resected (Fig. 2). An analogue procedure was carried out as described in the first patient (Supplementary Video 1). The patient left the hospital on POD 10. The pathological examination confirmed lymphatic metastases consisting of viable mature teratoma in all resected specimens, which did not reach the resection margin. A postoperative Horner’s syndrome resolved within 4 months. Due to the beneficial histology, no further chemotherapy was planned. Surveillance policy consisted of periodical PET-CT scans and tumour marker determination (AFP and HCG).

Presently, 12 months after surgery, the patient is without a sign of tumour recurrence in the follow-up PET-CT. Laboratory monitoring of the tumour markers revealed normal levels of AFP and HCG.

DISCUSSION

Although the incidence of testicular cancer has been increasing in industrialized countries in the last 30 years, the clinical outcome of patients with metastasized NSGCT could be remarkably improved by the introduction of multimodal treatment protocols, including cisplatin-based chemotherapy and surgery [2]. In general, a rapid removal of all residual tumour masses (4–6 weeks after chemotherapy) is indicated in patients with NSGCT. An incomplete resection of residual metastases is associated with decreased survival, even in patients with metastasis limited to the retroperitoneum. Moreover, all involved lymph node stages should be resected, because the histology after induction chemotherapy may diverge between different lymph node metastases. Evidence for residual cancer cells in lymph nodes affects further treatment planning. Thus, according to current guidelines, a resection as extensive as surgically possible and as the patient’s condition allows should be performed [3]. Kesler et al. described excellent long-term survival even in patients with already evident thoracic metastases if complete resection could be reached. In this study, 86
and 74% of patients were alive after 5 and 10 years of follow-up, respectively [4, 5].

However, patients can present with a wide range of metastatic spread and the limits of surgical resectability can be reached. This report of two cases demonstrates that even maximally extended metastatic disease is surgically accessible, provided that specific approaches are used. The described cervico-thoracic approach including an inverse T incision can be recommended as a surgical standard for treatment of such complex cases. The wide access allows an excellent exposure not only of the tumour masses, but also of vital structures such as nerves, vessels, oesophagus and tracheobronchial tree, which is crucially important to avoid post-operative morbidity.

In the first case, complete resection of the retroperitoneal metastases could not be achieved. Nonetheless, the decompression of intrathoracic structures, maximal tumour debulking and the beneficial histology of the remaining tumour led to long-term survival. Although the patient in the second case had a transient neurological impairment postoperatively, complete abdominal and cervico-thoracic metastasectomy could be achieved, providing the chance for excellent clinical outcome.

In our experience, the tumour bulks at the cervico-thoracic transition are difficult to mobilize from one direction. The combined collar and thoracic incision should be completed first. Afterwards, the tumour masses can be mobilized from both the cranial and the caudal direction. It is obvious that a detailed knowledge of the anatomical structures is a prerequisite for a good postoperative outcome after extended procedures. An advantage of the combined incision is that delicate structures, e.g. nerves, can be fully exposed, which facilitates their preservation.

In summary, these 2 cases illustrate that even in patients with excessive metastatic spread of NSGCT, favourable clinical outcome can be achieved by the combination of chemotherapy and specialized surgical removal. Surgery should be offered to patients with extensive NSGCT tumour residuals, despite the need for a large-scaled operative access. The inverse T incision is an excellent approach when bilateral exposure of the anterior and posterior mediastinum is a prerequisite for a complete tumour resection.

SUPPLEMENTARY MATERIAL

Supplementary material (Video 1) is available at EJCTS online.

Video 1: The summarized procedure is provided as video supplement (representative video material of patient 2).

Conflict of interest: none declared.

REFERENCES


Figure 2: Representative CT images of the second patient after induction chemotherapy. Metastatic tumour formations reached bilaterally from (A) the sub-mandibular, (B) para-tracheal, (C) para-aortic region to the (D) diaphragm.