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The introduction of early patient rehabilitation in surgery of soft tissue sarcoma and its impact on post-operative outcome

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Abstract

Background: Enhanced recovery after surgery (ERAS) programs are implemented in multiple fields of surgery, but not yet in soft-tissue sarcoma (STS) surgery. We wondered whether its introduction into STS surgery might have impacted postoperative outcome.
Methods: Two hundred and fifty seven adult patients with primary limb or trunk wall STS received ERAS from 2008 to 2012 as a part of the intra-operative management. We evaluated, in retrospect, the intra-operative management, post-operative outcomes, functional and oncological results of these patients and compared them with 459 prior patients treated under a standard recovery after surgery (SRAS) program from 1989 to 2007.
Results: The most visible change from SRAS to ERAS in the perioperative management was decrease of wound drainage (72% vs. 15%, $p < 0.001$) and increase of wound bandaging (16% vs. 66%; $p < 0.001$), underlining the appliance of the ERAS protocol. Post-operatively, hospital stay dropped from nine (0–74) to three (0–22) days ($p < 0.001$) without affecting major morbidity (8% vs. 5%, NS) or readmission to the hospital (5% vs. 4%, NS). Functional outcome improved ($p = 0.009$) but whether this change was due to ERAS remains to be proved because complementary treatments changed over time. Tumour control remained unaffected, with an estimated risk of local recurrence at 5 years of 12% in both groups.
Conclusion: Introducing a rapid recovery program was associated with a shorter hospitalization stay without compromising surgical or oncological outcomes. The program appears to be safe and reliable to use in patients undergoing STS surgery.

Keywords: Enhanced recovery after surgery; Fast-track; Soft-tissue sarcoma; Surgery; Morbidity; Functional outcome

Introduction

Programs for early rehabilitation or enhanced recovery after surgery (ERAS) are widely applied in bowel,[1] orthopaedic,[2] gynaecologic cancer,[3,4] and liver surgeries.[5] These programs consistently report reductions in post-operative pain,[6] a significant drop in post-operative morbidity, convalescence time and length of stay (LOS) at hospital.[1,7] Soft-tissue sarcoma (STS), mainly located in the extremities or the trunk wall, are treated by limb-sparing surgery, usually completed by radiotherapy.[8] Most

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studies in STS surgery have focused on oncological outcomes[9,10] or morbidity and functional outcome,[11] but to our knowledge, no study on early rehabilitation in STS surgery has yet been published.

At the Institut Bergonié, we introduced limb-sparing surgery for STS in 1975.[12] The abandonment of radical surgery (amputation and compartmental resection) prompted us to define criteria for resection quality within the new multidisciplinary treatment approach. It was done in the frame of the French Sarcoma Group (GSF-GETO).[13] We evaluated those defined resection quality criteria on successive patient groups from our institution, showing that they were reliable[14] and predictive for oncological outcome.[15] Oncological results compared favourably to literature data making such a conservative surgery within a multidisciplinary approach standard of care in our center.[16] However, hospital care revealed unsatisfactory with prolonged LOS, favoured by persisting wound drainages and lack of patient autonomy. We consequently introduced changes in the perioperative patient care with successive changes in drainage techniques and finally their abandon, replacing drainage by compressive bandaging (wrapping). Concomitantly we introduced better pain control through loco-regional analgesia and early ambulation. After a transition period from 2004 to 2007 and with the arrival of a physiotherapist, we introduced a formal program for ERAS in 2008. The aim of this study is to evaluate whether this program revealed to be safe in patients operated for primary limb and trunk wall STS in terms of post-operative morbidity and late functional outcome.

Methods

Patient selection and treatment periods

After institutional review board approval, patient charts were extracted and cross-checked from both our institutional database for STS surgery and Conticabase, an international sarcoma database, including tumour and treatment characteristics of patients treated at our Institute. Adult patients (≥16 years) with primary non-metastatic STS located in the trunk wall or the limbs that were operated at Institut Bergonié between 1989 and 2012 were included in the study. We then compared patient outcomes from the ERAS period (2008–2012) to the prior standard recovery after surgery (SRAS) period (1989–2007).

Surgery and the ERAS program

The oncological aim of surgery was resection according GSF-GETO principles[13–15] which remained unchanged over time. In contrast, from 2008 onwards, we systematically adapted ERAS measures from recommendations of the ERAS® pathway of the ERAS society to limb and trunk wall STS. They comprised pre-, intra-, and post-operative measures. Prior to the operation, the patients were given detailed information about the surgical program and preventive measures (e.g. re-nutrition after weight loss) were taken. Sugary drinks were allowed up to two hours prior to anaesthesia. Compressive stockings were put on, but no thrombo-prophylactic medicines were given. Neither prophylactic antibiotics were given nor was a urinary catheter set. During surgery, general anaesthesia was complemented by administering a loco-regional analgesic for pain prevention. We avoided tourniquets in order to prevent ischaemia, and performed a gentle tissue-, nerve- and vessel-sparing dissection. We used tension-free wound closure, or if needed tissue flaps. Wound drainage was omitted whenever possible and in order to avoid dead spaces favouring fluid collections, a compressive bandaging (wrapping) was applied mainly to extremity sarcoma, whereas stitches securing the skin to underlying tissues were applied mainly to trunk wall sarcoma. Exceptions for maintaining drainage were particularly difficult dissections with huge tissue losses or specific locations making a bandage difficult to pose. No splint was set-up, allowing the joints to move freely. No patient stayed in the intensive care unit (ICU). Loco-regional analgesics were continued post-operatively, and subsequently replaced by oral analgesics. The role of the physiotherapist was crucial in helping the patients to reacquire their autonomy in the post-operative period. By his reassurance and technical support he helped them to retrieve confidence, allowing them to move their body without pain and walk around as early as day 0. The bandages were removed after day 1 and the dressing after day 2, leaving the suture open thereafter (Fig. 1). The patients were allowed to have showers. Stockings were kept until the patients were discharged. The patients were discharged as soon as they were able to walk autonomously without pain. After discharge, patients were advised to continue with the apprised self-re-education technique, but physiotherapy was not prescribed, in order not to hamper wound healing during the first four post-operative weeks. Oral analgesics, mainly paracetamol completed by tramadol if needed, were continued for few days with no other medical treatment. A post-operative visit was organized four weeks after surgery. In the event of a complication, especially seroma formation, patients were advised to contact our outpatient consultation unit for drainage. Information was provided verbally and no written patient consent was required.

Multidisciplinary treatment and follow-up

Treatment protocols during the time period foresaw post-operative external beam radiotherapy in patients with deep STS of the limbs or trunk wall. A 50 Gy dose was prescribed, completed by a boost after R1 resections.[14,17] In the beginning of the period patients with high-grade tumours received adjuvant chemotherapy, based on combinations with doxorubicin. Following multidisciplinary decision, patients with locally advanced high-grade tumours received pre-operative neo-