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Role of nutritional status in the early postoperative prognosis of patients operated for retroperitoneal liposarcoma (RLS): A single center experience

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ABSTRACT

Purpose: To assess the nutritional status and its role in the outcome of patients operated for retroperitoneal liposarcoma (RLS).
Material and methods: Retrospective study on consecutive patients operated with *en bloc* compartment resection for primary or local recurrence of RLS between 2016 and 2017. Preoperative nutritional and laboratory assessment comprising serum albumin, serum transthyretin, orosomucoid, and CRP was systematically performed. The following preoperative parameters were analysed: weight, body mass index (BMI), significant weight loss (>5% in one month and/or >10% in 6 months), serum albumin, transthyretin, CRP, orosomucoid. PINI (prognostic inflammatory and nutritional index) was calculated.
Results: There were 40 patients operated for RLS: 22 women and 18 men with a median age of 61 years (34–90). Median tumour was 280 mm (80–530). Median preoperative BMI was 24.8 (18–42) and median postoperative BMI was 23 (17.8–44). Twenty-one patients (52.5%) were considered to be malnourished: 3 with biological signs of malnutrition and 18 with weight loss. Eleven (47.6%) in the group of malnourished patients and 4 (26.3%) in the group with satisfactory nutritional status developed postoperative complications ($p = 0.042$). A PINI score>1 was related to significantly longer hospitalisation time 21.8 days (10–58) in comparison with 14.9 [9–30] in patients with PINI < 1, $p = 0.003$.
Conclusions: The malnourished patients with RLS experienced more postoperative complications and longer hospitalisation. Nutritional status and biological markers contribute to the global management of RLS with improved postoperative behaviour including fewer complications and shorter hospitalisation. A prospective larger study with longer follow-up is necessary to refine these results.

Introduction

Retroperitoneal sarcoma is a rare tumour accounting for 12% of all soft tissue sarcomas [1–4]. The mean incidence of retroperitoneal sarcoma is 2.7 cases per 100,000 inhabitants and this incidence has remained relatively stable over time [3]. *En bloc* surgical resection of localized tumours is the standard treatment for this disease [4,5]. Neither chemotherapy [6] nor radiotherapy are part of standard therapy for primary tumours, but the possible benefit of radiotherapy is currently being evaluated in a randomized trial (STRASS, EORTC) [7]. Overall survival has recently been improved as a result of so-called compartment surgery, which consists of resecting organs included in the tumour and those directly adjacent to the tumour in order to obtain the largest possible negative surgical margins [8]. The 5-year survival, less than 60% in historical series, is currently 75% following appropriate surgery [9,10]. Liposarcoma is the predominant form of retroperitoneal sarcoma and presents as a large, painless or minimally painful mass with late

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symptoms related to the size of the tumour. The tumour may remain subclinical for many years in the case of well differentiated liposarcoma, with a more rapid course when the tumour presents zones of loss of differentiation. Patients report a very progressive increase of abdominal girth and very frequently go on a weight-reducing diet either at their own initiative or at their doctor's advice, which is a truly specific feature of this type of tumour. This is very important, as this inappropriate diet can lead to a state of malnutrition independently of subsequent feeding problems related to significant compression of the gastrointestinal tract by the tumour.

Due to the anatomical situation of the retroperitoneal liposarcomas in the retro peritoneum and their contact with adjacent organs that may be included in the tumour, (kidney, gastrointestinal tract, spleen, adrenal glands, ureters, diaphragm, and blood vessels), compartment surgery constitutes a real technical challenge and should therefore be performed by a specialized team in a well-equipped centre [11]. This multi-organ surgery comprises gastrointestinal resections, associated with a high risk of morbidity, highlighting the importance of the patient's nutritional status. This type of surgery is particularly difficult in older people and patients with several comorbidities.

Most published studies have described the surgical technique and treatment strategy [12,13]. However, over recent years, there has been a growing interest in perioperative and intraoperative resuscitation and nutritional management in these patients. Various methods and prognostic scales, such as BMI (body mass index), PINI (prognostic inflammatory and nutritional index), NRI (nutritional risk index), CRP (C-reactive protein), serum albumin, and serum transthyretin have been studied [14–28].

Retroperitoneal liposarcoma is a model of difficult perioperative management and intensive care, comprising multiple organ resections associated with a high risk of morbidity, potentially exacerbated by malnutrition. Preoperative malnutrition is multifactorial, and self-imposed diet is a highly specific cause. In addition, the notion of overweight in these patients is very relative, as it is partially related to the weight of the tumour, which can easily reach 20–30 kg.

In postoperative period weight loss is multifactorial, related to the large weight of the resected tumour, decreased or even absent food intake related to prolonged postoperative ileus, bleeding during the surgical operation, and also the nutritional status of patients who may sometimes be obese despite the presence of malnutrition.

The purpose of this study was to assess the nutritional status, and its role in the outcome of patients operated for retroperitoneal liposarcoma, and the management of patients operated for RLS in our centre with the use of laboratory tests and prognostic scales to evaluate and adapt treatment to their needs. To our knowledge, this is the first study on this subject in a homogeneous population of patients in the literature.

Material and methods

This was a retrospective study conducted on consecutive patients operated at Institut Curie, Paris, for primary or local recurrence of retroperitoneal liposarcoma between January 2016 and June 2017. Retroperitoneal tumours corresponding to other histological types and patients simply managed by percutaneous biopsy or exploratory laparotomy in our centre were excluded from the study (Fig. 1).

The study was approved by the Institut Curie sarcoma group and was conducted in accordance with French regulations concerning individual data collection. All data concerning these patients were collected in our canter's ELIOS database and were analysed retrospectively.

Analysis was essentially descriptive in view of the limited number of patients. Spearman's correlation coefficient was sometimes used to assess nonparametric statistical associations between two variables.

Diagnosis

An imaging assessment (Fig. 2) comprising chest, abdomen, pelvic CT scan and MRI in the case of pelvic or muscle extension was available for all patients. In accordance with ESMO guidelines, percutaneous biopsy was performed, except when contraindicated, to confirm the diagnosis and subtype of the retroperitoneal liposarcoma.

Surgery

The indication for surgery was determined at an Institut Curie multidisciplinary team meeting. All patients attended a surgical, anaesthetic and, when necessary, geriatric assessment before the operation. A nursing consultation was also systematically performed. Surgery in these patients consisted of *en bloc* compartment resection (Fig. 2), comprising, in the majority of cases, hemi colectomy, nephrectomy, resection of fascia or psoas muscle, sometimes combined with adrenal resection, splenectomy, or splenopancreatectomy, diaphragmatic surgery and vena cava or iliac vessel surgery.

Anaesthesia

Anaesthetic, intensive care and nutritional management were conducted according to national and international guidelines. Intraoperative anaesthetic management consisted of combined general and peridural anaesthesia, strict haemodynamic monitoring by invasive arterial blood pressure monitoring and fluid therapy, a tranexamic acid blood-sparing protocol, monitoring of blood, urinary, gastric and insensible fluid losses, and monitoring of the neuromuscular blockade and level of anaesthesia. Plasma expansion by aqueous solutions and transfusion of blood products was designed to maintain stable haemodynamic. Antibiotic prophylaxis with a 3rd generation cephalosporin was administered to all patients, except for those with cephalosporin allergies, in whom clindamycin/gentamicin was used.

Dietetic and nutritional management

All patients with RLS attended one or several preoperative and postoperative dietetic consultations. Oral Impact® was systematically prescribed preoperatively. A preoperative nutritional and laboratory assessment comprising serum albumin, serum transthyretin (also called prealbumin), orosomucoid, and CRP was systematically performed. Minimal and optimal energy requirements were determined. Parenteral nutrition by SmofKabiven® with electrolytes was initiated on postoperative day 1 at 30 kcal/kg/day and was continued until complete resumption of oral feeding. Patients with insufficient oral feeding and presenting prolonged postoperative ileus, commonly observed following surgery for retroperitoneal sarcoma, received supplementary nocturnal doses of SmofKabiven® for as long as necessary. The degree of malnutrition was evaluated according to *Haute Autorité de la Santé (HAS)* (French National Authority for Health) criteria (https://www.has-sante.fr/portail/jcms/c_432199/fr/evaluation-diagnostique-de-la-denutrition-proteino-energetique-des-adultes-hospitalises). The following preoperative parameters were analysed: weight, body

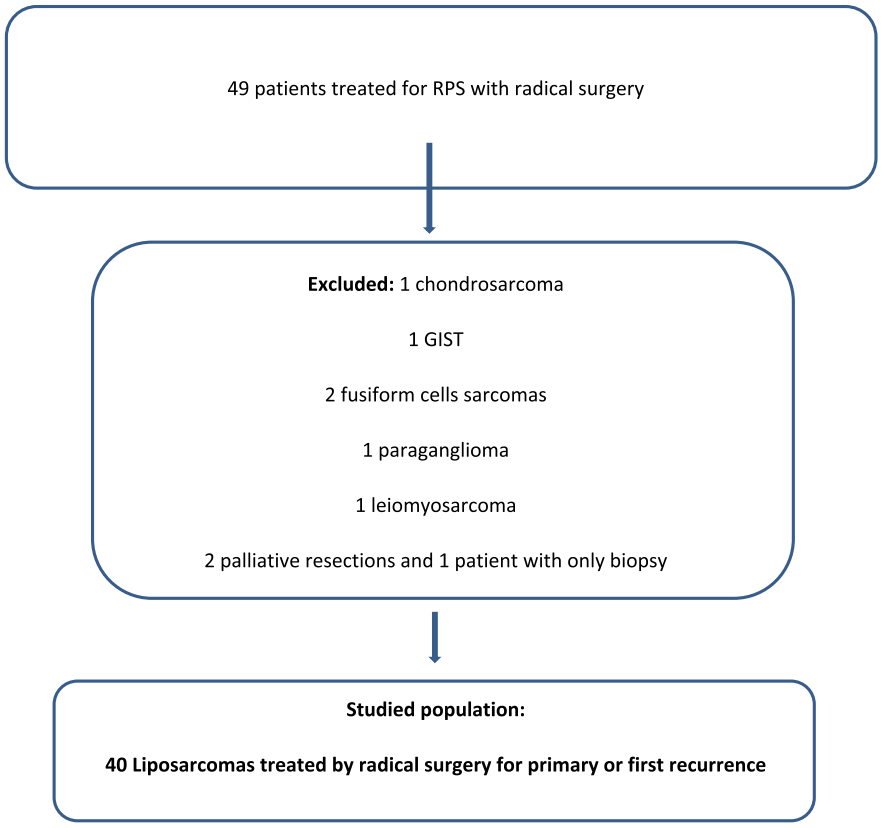

Fig. 1. Flow chart of presented study. RPS = retroperitoneal liposarcomas.

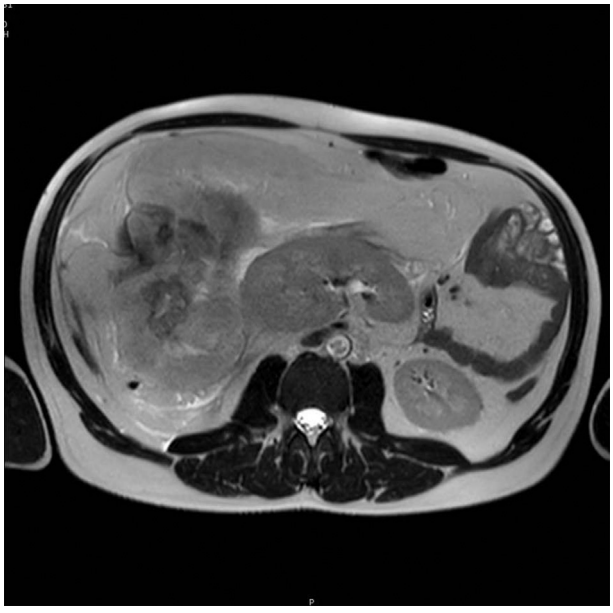

Fig. 2. MRI Image of one of reported patients with RLS of 53 cm.

mass index (BMI), 5% weight loss in one month and/or >10% in 6 months, serum albumin, serum transthyretin, CRP, orosomucoid and PINI and NRI were calculated. Nutritional status and minimal and optimal energy requirements were determined.

The same parameters were analysed prior to discharge from hospital and the patients were provided with dietary recommendations. Malnourished patients or at risk of malnutrition were reviewed at a subsequent dietetic consultation.

The Prognostic Inflammatory and Nutritional Index (PINI) is obtained by calculating the ratio of proteins of inflammation, represented by C-reactive protein and orosomucoid, to nutritional proteins by means of the following formula: PINI = [CRP (mg/L) × Orosomucoid (mg/L)]/[Albumin (g/L) × Transthyretin (mg/L)]. Normal value is <1; a PINI score greater than 11 indicates a major risk of organic complications; a PINI score greater than 30 indicates a life-threatening state.

Protein markers: Laboratory assessment of nutritional status was mainly based on serum albumin assay, which reflects protein deficiency impacting on the body's defence functions. Serum albumin concentrations must be interpreted as a function of CRP levels (protein of inflammation) and the presence of other possible causes of hypoalbuminaemia (liver failure, nephritic syndrome, gastrointestinal losses). Serum albumin is a poorly reactive marker to short-term variations of nutritional status due to its long half-life (about 3 weeks). Transthyretin, the hepatic synthesis of which is also decreased in the presence of inflammation, is more reactive than serum albumin, with a half-life of 48 h.

Multipara metric Index: Many multipara metric indices have been constructed to define and monitor nutritional status, but the only index currently used in adults up to the age of 75 years is the Nutritional Risk Index (NRI) or Buzby's index (reference), which is calculated as follows:

NRI = 1.519 × serum albumin (g/L) + 0.417 × (current weight/usual weight) × 100.

The NRI was used to classify patients into 3 classes: i) >97.5%: normal nutritional status; ii) 83.5–97.5%: moderate malnutrition and iii) <83.5%: severe malnutrition.

Postoperative follow-up

The parameters analysed postoperatively to assess morbidity and mortality were: intensive care unit length of stay and total hospital length of stay, duration of postoperative ileus and resumption of oral feeding, duration of parenteral nutrition and mixed nutrition (enteral and parenteral), postoperative complications and their management. Duration of post-operative ileus was measured in post-operative days after the day of surgical procedure. The term abscess was used in case of infected hematoma or deep infection process or wound infection.

Outcome

The patient's status and control of the sarcoma at last news were recorded. Follow-up was calculated from the date of surgery to the date of last news recorded in the patient's medical records.

Histology

Oriented operative specimens were sent to the pathology department and were examined in terms of tumour size, invasion of resected organs, surgical margins and the degree of differentiation and grade of the liposarcoma, according to FNCLCC (French cancer centre federation) criteria. Molecular biology analysis looking for amplification of the MDM2 gene was performed whenever possible.

Complementary treatments

Some patients received preoperative radiotherapy in the context of the EORTC STRASS trial coordinated by Institut Curie. The indication for postoperative radiotherapy or adjuvant chemotherapy, particularly in the case of recurrence, was discussed at multidisciplinary team meetings. All complementary treatments were documented.

Results

Patient and tumour characteristics

After exclusion of ineligible patients (Fig. 1), the study population consisted of 40 patients operated for RLS: 22 women and 18 men with a median age of 61 years (range: 34–90 years). Median tumour diameter was 280 mm (range: 80–530 mm). Median follow-up was 7 months (range: 1–15 months).

Patient characteristics as well as treatments, follow-up and outcome are presented in Table 1. All patients underwent radical

Table 1
Patients' characteristics, treatment and outcome.

Patient	Age	Sex	PS	ASA	Type of LipoSa	Size (mm)	RT and or CT before or after surgery	Follow-up (months) and outcome
1	**76**	**M**	**0**	**3**	**Primary**	**305**	**0**	**1 + Alive, free of disease**
2	**41**	**M**	**0**	**1**	**Primary**	**530**	**0**	**6 + Alive, free of disease**
3	**37**	**M**	**0**	**2**	**Primary**	**450**	**0**	**3 + Alive, free of disease**
4	**73**	**M**	**0**	**2**	**Primary**	**220**	**0**	**8 + Alive, free of disease**
5	61	M	0	2	Recurrence	160	RT after	8 + Alive, free of disease
6	67	M	0	2	Primary	360	CT after	6 + Alive with recurrence
7	**47**	**M**	**0**	**2**	**Primary**	**460**	**0**	**6 + Alive, free of disease**
8	**37**	**M**	**0**	**2**	**Primary**	**200**	**0**	**13 + Alive, free of disease**
9	57	M	0	1	Primary	155	0	11 + Alive, free of disease
10	40	M	0	1	Primary	370	RT after	13 + Alive, free of disease
11	68	M	0	2	Primary	200	RT after	6 DEATH (disease progression)
12	38	M	0	1	Recurrence	160	RT before and after CT after	12 + Alive, but disease progression
13	87	M	1	3	Primary	270	RT after	8 + Alive, free of disease
14	59	M	1	2	Primary	250	0	10 + Alive, free of disease
15	**68**	**M**	**1**	**2**	**Primary**	**340**	**0**	**2 + Alive, free of disease**
16	49	M	0	2	Primary	130	0	2 + Alive, free of disease
17	**44**	**M**	**0**	**1**	**Primary**	**380**	RT before	**3 + Alive, free of disease**
18	**64**	**M**	**1**	**2**	**Primary**	**200**	**0**	**3 + Alive, free of disease**
19	76	F	0	2	Primary	240	0	8 + Alive, free of disease
20	51	F	0	2	Primary	400	0	7 + Alive, free of disease
21	72	F	0	2	Primary	500	0	7 + Alive, free of disease
22	**65**	**F**	**0**	**3**	**Primary**	**370**	**0**	**11 + Alive, free of disease**
23	68	F	1	2	Primary	140	0	1,5 + Alive, free of disease
24	**90**	**F**	**1**	**3**	**Primary**	**400**	**0**	**0,7 DEATH (respiratory and cardiac failure)**
25	**65**	**F**	**1**	**2**	**Primary**	**230**	**CT after**	**15 + Alive, lung metastases**
26	**51**	**F**	**0**	**2**	**Primary**	**400**	**0**	**12 + Alive, free of disease**
27	71	F	1	2	Primary	260	0	14 + Alive, free of disease
28	**81**	**F**	**1**	**2**	**Primary**	**390**	**0**	**8 + Alive, free of disease**
29	**34**	**F**	**0**	**1**	**Primary**	**480**	**0**	**7 + Alive, free of disease**
30	**62**	**F**	**0**	**2**	**Primary**	**290**	**0**	**11 + Alive, free of disease**
31	58	F	0	2	Primary	110	0	7 + Alive, free of disease
32	85	F	1	2	Primary	290	0	9 + Alive, free of disease
33	**55**	**F**	**1**	**2**	**Primary**	**280**	**0**	**2 + Alive, free of disease**
34	71	F	1	1	Primary	220	0	2 + Alive, free of disease
35	51	F	1	2	Recurrence	180	RT before	2 + Alive, free of disease
36	**56**	**F**	**0**	**2**	**Primary**	**NA**	**RT**	**3 + Alive, free of disease**
37	41	F	0	1	Recurrence	150	0	2 + Alive, free of disease
38	**55**	**F**	**0**	**1**	**Recurrence**	**NA**	**0**	**2 + Alive, free of disease**
39	**65**	**F**	**0**	**2**	**Primary**	**NA**	**0**	**2 + Alive, free of disease**
40	**72**	**F**	**0**	**2**	**Primary**	**NA**	**0**	**2 + Alive, free of disease**

Bold font: Malnourished patients according to HAS Criteria; PS: performance status; ASA – American society of anesthesiologist physical classification system; RT = radiotherapy, CT = chemotherapy, F = female, M = male.

surgery. Median operating time was 5 h (range: 2.5–8 h) with a mean of 4.9 h. Mean blood loss was 528 mL (range: 50–5000 mL). Surgery mainly consisted of resection of the primary tumour or recurrence of retroperitoneal liposarcoma ± hemi colectomy ± nephroureterectomy ± adrenalectomy and or vascular resection.

In this series, hemi colectomy was performed in 29 (72.5%) cases, nephrectomy was performed in 31 (77.5%) cases, cholecystectomy was performed in 8 cases, vena cava resection, adrenalectomy, cephalic duodenopancreatectomy were performed in 5 cases, femoral nerve liberation was performed in 4 cases and obturator nerve liberation was performed in 1 case.

Morbidity and mortality

No nutrition-related mortality was observed, as nutritional management was adapted to the needs of each patient in this series. A 90-year-old woman with a 45 cm tumour died from postoperative medical complications (heart failure and respiratory failure, unable to be weaned from the respirator). Two patients were reoperated (colonic fistula) and one patient developed pancreatic fistula. All complications and length of stay are presented in Table 2.

Impact of nutritional status on the postoperative course

Median preoperative BMI was 24.8 (range: 18 to 42) with a mean of 25.8 and median postoperative BMI was 23 (range: 17.8–44). Twenty-one patients (52.5%) were considered to be malnourished: 3 with biological signs of malnutrition and 18 with weight loss >5% in one month and/or >10% in 6 months. Eleven patients (47.6%) in the group of malnourished patients and 4 patients (26.3%) in the group with satisfactory nutritional status developed postoperative complications. Spearman's correlation coefficient showed that malnutrition was correlated with a higher risk of complications ($p = 0.042$), Table 3. Lengths of stay and complication rates with the types of complications are presented in Tables 2 and 3.

The median hospital length of stay was 18 days (range: 10–58) in malnourished patients versus 15 days (range: 9–37) in patients with satisfactory nutritional status. Length of stay was longer for malnourished patients, but Spearman's correlation coefficient was not significant ($p = 0.077$) (Table 3).

Length of stay was longer for the patients with abnormal PINI score more than 1 in comparison to a normal PINI score <1 but incidence of complications does not reach significativity (Table 4). There was no significative difference of length of stay and complications between the patients with normal and abnormal NRI score

Table 2
Patients' characteristics and complications.

Patient	PINI	NRI	Hospitalisation (days)	Complications	Type of complication
1	**Normal**	**Normal**	**17**	**0**	**0**
2	**Abnormal**	**Abnormal**	**18**	**0**	**0**
3	**Normal**	**Normal**	**16**	**0**	**0**
4	**Abnormal**	**Abnormal**	**58**	**1**	**Pneumonitis, swallowing troubles, respiratory failure and assistance.**
5	Normal	Normal	15	0	0
6	Abnormal	Abormal	15	0	0
7	**Abnormal**	**Abnormal**	**21**	**1**	**Pneumonitis, abscess**
8	**Abnormal**	**Abnormal**	**18**	**0**	**0**
9	Abnormal	Abnormal	10	0	0
10	Abnormal	Abnormal	16	0	0
11	Abnormal	Normal	30	1	Abscess
12	Normal	Normal	12	0	0
13	Abnormal	Abormal	16	0	0
14	Abnormal	Abnormal	15	1	Urinary tract infection
15	**Abnormal**	**Abnormal**	**12**	**0**	**0**
16	Normal	Normal	18	1	Abscess
17	**Normal**	**Normal**	**10**	**1**	**Urinary tract infection**
18	**Abnormal**	**Normal**	**18**	**1**	**Pneumonitis, hematemesis**
19	Normal	Normal	16	0	0
20	Normal	Normal	13	0	0
21	Abnormal	Normal	37	1	Pneumonitis, pneumothorax, abscesses, sepsis.
22	**Normal**	**Normal**	**30**	**1**	**Haemorrhages**
23	Normal	Normal	15	0	0
24	**Abnormal**	**Abnormal**	**28**	**1**	**DEATH (respiratory and cardiac failure)**
25	**Abnormal**	**Abnormal**	**26**	**0**	**0**
26	**Abnormal**	**Abnormal**	**21**	**1**	**Urinary tract infection**
27	Abnormal	Abnormal	20	0	0
28	**Abnormal**	**Abnormal**	**18**	**1**	**Urinary tract infection**
29	**Normal**	**Abnormal**	**10**	**0**	**0**
30	**Normal**	**Normal**	**13**	**1**	**Urinary tract infection**
31	Normal	Normal	13	0	0
32	Normal	Normal	16	0	0
33	**Normal**	**Normal**	**17**	**0**	**0**
34	Normal	Normal	10	0	0
35	Normal	Normal	12	0	0
36	**Abnormal**	**Abnormal**	**28**	**1**	**Abscess**
37	Normal	Normal	9	0	0
38	**Normal**	**Normal**	**19**	**0**	**0**
39	**Abnormal**	**Abnormal**	**12**	**0**	**0**
40	**Normal**	**Normal**	**12**	**1**	**Abscess**

PINI score >1 = Normal, PINI score > 1 = Abnormal; NRI score > 97,5 = Normal, <97,5 = Abnormal; Complications: 1 – Yes, 0– no.
Bold font: Malnourished patients according to HAS criteria.

Table 3
Evaluation of median hospitalization time and post-surgical complications in relationship with nutritional status evaluated by HAS criteria.

Patients	Malnourished, n = 21 (100%)	Normal nutritional status, n = 19 (100%)	*p*
Median hospitalization time in days (range)	18 (10–58)	15 (9–37)	NS
Complications	11 (52.4%)	4 (21%)	*0.042*

Table 4
Evaluation of median hospitalization time and post-surgical complications in relationship with nutritional status evaluated by biological predictors (PINI score).

Patients Selected by PINI score	Group PINI < 1, n = 20	Groupe PINI > 1, n = 20	*p*
Median hospitalization time in days (range)	**14.9 (9–30)**	**21.8 (10–58)**	***0.003***
Complications	5	10	*NS*

Table 5
Evaluation of median hospitalization time and post-surgical complications in relationship with nutritional status evaluated by multiparametric indice (NRI score).

Patients Selected by NRI score[a]	Group NRI > 97.5 n = 22	Groupe NRI < 97.5 n = 18	*p*
Median hospitalization time in days (range)	21.8 (9–30)	20 (10–58)	*NS*
Complications	7	8	*NS*

[a] Sensibility reduced in our series because 21 of 40 patients were presented with inflammation syndrome (CRP > 6).

(Table 5). Mean time to recovery of bowel function was 8 days in malnourished patients versus 6 days in patients with satisfactory nutritional status.

Discussion

This is the first retrospective study to be conducted in a homogeneous population of patients with retroperitoneal liposarcoma treated by radical surgery performed in a specialized centre, comprising data on nutritional status and global preoperative and postoperative management in the context of a multidisciplinary treatment strategy [3–5,29–31]. The results of this study show that patients with high PINI or malnutrition, according to HAS criteria, have a longer hospital stay or experience higher number of complications respectively. In addition the NRI is not an adequate indicator in this specific situation of postoperative RLS. The adapted, complex, multidisciplinary management ensures better overall survival of about 75% with low mortality in a specialized centre [31]. Malnutrition has long been recognised as a risk factor for post-operative morbidity and mortality [32]. The interest of pre- and postoperative nutrition is already recognised as Traditional metabolic and nutritional care of patients undergoing major elective surgery has emphasised pre-operative fasting and re-introduction of oral nutrition 3–5 days after surgery [32]. Attempts to attenuate the consequent nutritional deficit and to influence post-operative morbidity and mortality have included parenteral, enteral and oral sip feeding.

Retroperitoneal liposarcomas are almost always diagnosed at an advanced stage, when they are very large, which means that the patient's real weight includes the weight of the tumour. It is therefore difficult to accurately assess the patient's nutritional status on the basis of classical parameters: weight, height and BMI. The use of combinations of specific laboratory markers is therefore particularly useful in these patients with advanced sarcoma, especially serum albumin, serum transthyretin, and PINI, in combination with clinical parameters (voluntary or involuntary weight loss). These markers were used to define a high-risk population, as previously reported by several authors [7–9]. In parallel, it is essential to evaluate all risk factors and comorbidities preoperatively and propose appropriate intensive preparation, as already discussed in several published studies [18–20].

Specialized multidisciplinary management clearly reduces the risks of surgery, as only one postoperative death was observed in a 90-year-old woman with very advanced sarcoma. The European Cancer Organization (ECCO) has very recently recommended that these patients be managed in specialized units devoted to these complex multi-organ resections [11], as the operative mortality in specialized units is about 3%, despite unfavourable patient and tumour characteristics in the majority of cases [33,34].

Although data of the literature confirm that laboratory markers can be useful to diagnose malnutrition at an early stage, a more thorough assessment appears to be necessary in retroperitoneal liposarcoma, possibly comprising more sensitive tools to evaluate nutritional status of overweight and obese subjects.

These preliminary results based on a limited patient population recruited over a period of 18 months show demonstrate limited mortality and morbidity in a specialized centre in this complex sarcoma surgery, supporting the French Sarcoma Group and ECCO recommendations: centralization of patients in expert centres [11].

This study comprises several limitations, including the small number of patients and the limited follow-up, but this is a very rare tumour and this study focused on the postoperative period and nutritional management rather than specific survival. This study was also deliberately confined to a recent period to ensure a maximum of clinical and laboratory data despite the retrospective nature of the study.

The strengths of this study are the homogeneous population of patients with retroperitoneal sarcoma, more specifically liposarcoma, as the other histological subtypes raise different problems. All patients were operated by a surgeon specialized in sarcomas with perioperative management by team of experienced anaesthetists-intensive care physicians in a reference centre assisted by the nutrition team.

Conclusion

Nutritional status and biological markers can contribute to the global management of patients with retroperitoneal liposarcomas, which are almost always locally advanced tumours requiring multi-organ resections, by proposing treatment tailored to each patient. The malnourished patients in this study experienced more post-operative complications as well as longer hospitalisation time. Nutritional status, biological markers and PINI score can contribute to the global management of patients with RLS with improved postoperative behaviour with fewer complications and shorter hospitalisation. A prospective study based on a greater number of patients with longer follow-up is necessary to refine these results.

Conflict of interest statement

No conflicts of interest.

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