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Omentoplasty for the Prevention and Treatment of Complications after Abdomino-Perineal Rectal Resection – Analysis of 21 Consecutive Cases

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Abbreviations:
APRR: abdomino-perineal rectal resection;
OF: omentum flap.

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Rezumat

Omentoplastia pentru profilaxia și tratamentul complicațiilor după rezecția rectală abdomino-perineală – analiza a 21 de cazuri consecutive

Context: Rezecția rectală pe cale abdomino-perineală este asociată cu o rată semnificativă de complicații postoperatorii, multe dintre ele fiind legate de spațiul mort pelvi-subperitoneal restant după îndepărtarea rectului.
Material şi Metodă: Am efectuat un studiu retrospectiv pe 21 de pacienți consecutivi operați în Clinica Chirurgie – Spitalul Clinic Județean Mureş / Universitatea de Medicină, Farmacie, Ştiințe şi Tehnologie G.E. Palade din Târgu-Mureş, România în perioada 01.01.2010 – 01.01.2022 la care am folosit un lambou de epiploon pentru profilaxia primară sau secundară, respectiv tratamentul unor complicații asociate cu spațiul restant după rezecția rectală pe cale abdomino-perineală; toate intervențiile au fost efectuate prin abord deschis (laparotomie mediană) iar mobilizarea epiploonului s-a făcut în funcție de situația anatomică locală.
Rezultate: Nu am înregistrat nici un caz de ischemie a lamboului (evaluare vizuală intraoperatorie la sfârşitul operației şi evoluție postoperatorie). În perioada post-operatorie imediată am întâlnit un deces prin infarct miocardic şi două supurații de plagă; durata de reluare a tranzitului intestinal a variat între 2 şi 7 zile, cu o medie de 3.5 zile. La urmărirea tardivă (între 2 şi 8 ani) am întâlnit 5 decese prin metastaze la distanță, 2 eventrații, 2 cazuri de recidivă tumorală locală dar nici o reintervenție pentru ocluzie intestinală. Per ansamblu, nu am întâlnit complicații care să poată fi puse în mod direct pe seama folosirii lamboului de epiploon.
Concluzii: Epiploonul rămâne o soluție simplă şi rapidă pentru prevenirea şi rezolvarea unor complicații locale asociate cu chirurgia cancerului rectal inferior iar folosirea lui nu pare a fi asociată cu o morbiditate suplimentară.

Cuvinte cheie: rezecție rectală abdomino-perineală, cancer rectal, lambou epiploon, omentoplastie, complicații

Abstract

Context: The abdomino-perineal rectal resection (APRR) is associated with a significant rate of postoperative complications, many of them related to the pelvi-subperitoneal dead space that remains after the removal of the rectum.

Material and Methods: We performed a retrospective study on 21 consecutive patients operated in the Surgical Clinic - Mureş Clinical County Hospital / G.E. Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureş, Romania between 01.01.2010 – 01.01.2022 in whom we used an omental flap (OF) for primary and secondary prophylaxis, as well as for the treatment of complications associated with the remnant space after APRR; all the procedures were performed using an open approach (median laparotomy) and the mobilization of the omentum was made according to the local anatomical situation.

Results: We encountered no case of flap ischemia (intraoperative evaluation at the end of the procedure and post-operative course). In the early postoperative period, we encountered one exitus through myocardial infarction and two wound suppurations; the time required for the regain of the intestinal transit ranged between 2 and 7 days, with a median of 3.5 days. At late follow-up (between 2 and 8 years) we encountered 5 deaths through distant metastases, 2 incisional hernias, 2 cases of local recurrence, and no reoperation for intestinal obstruction. Overall, we did not find any complication directly related to the use of the OF.

Conclusions: The omentum remains a simple and quick solution for the prevention and solving of some of the complications associated with low rectal cancer surgery while its use does not seem to be associated with a significant supplementary morbidity.

Keywords: abdomino-perineal rectal resection, rectal cancer, omentum flap, omentoplasty, complications

Introduction

The abdomino-perineal rectal resection (APRR) remains the standard surgical treatment of low rectal cancers (1,2). Despite some significant improvements achieved in recent years (minimally invasive laparoscopic / robotic approach), this procedure is still associated with a significant morbidity, many of the postoperative complications being related to the pelvi-subperitoneal space and the perineal wound that remain after the complete removal of the rectum (3-5). The objective of this paper is to evaluate the possibilities and the limits of the use of the omentum flap (OF) for both the prophylaxis and the treatment of the complications associated with the pelvi-subperitoneal space that remains after the APRR.

Methods

Patients

We performed a retrospective study on a series of 21 patients operated in the Surgical Clinic - Mureş Clinical County Hospital – G.E. Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureş, Romania between 01.01.2010 – 01.01.2022. The criteria for inclusion in this study were the use of an omental flap for primary or secondary prophylaxis or the treatment of complications associated with the pelvi-subperitoneal space remaining after APRR. The patients with low anterior resection with coverage of the anastomosis with the omentum or those in whom an OF was used for the solving of other pelvic complications after other types of procedures were not included in this study. All the procedures were performed by the same surgeon. The age of the patients ranged between 48 and 82 years, with an average of 63 and the male / female ratio was 14/5. *Table 1* presents details about the lesion and the indication / motivation for the use of the OF. All the participants agreed to be included in this study and signed an informed consent. This retrospective study was approved by the Ethical Committee of the Mureş Clinical County Hospital and was conducted according to the statements and ethical principles of the Helsinki Declaration of the World Medical Association concerning human medical research.

Surgical Technique

The main purpose of the procedure was to achieve the complete coverage/ filling of the pelvi-subperitoneal space remaining after the APRR; in one case we also covered a sacral tumoral recurrence which was responsible for the development of an intestinal obstruction through small bowel invasion, and in another case we used the omentum to separate the peritoneal cavity from the outside (open perineal wound). The choice of

Table 1. Details about the lesion and the motivation for the use of the OF after APRR

Lesion	Motivation of the use of the omental flap	No. cases
- low rectal cancer – APRR	- primary prophylaxis	13
- intestinal obstruction with angulation of the small bowel in the pelvi-subperitoneal space remaining after APRR	- obliteration of the space to prevent the recurrence of the intestinal obstruction	6
- intestinal obstruction after APRR through sacral recurrence with invasion of the small bowel	- coverage of the tumoral recurrence in order to prevent a new invasion of the small bowel	1
- complex entero-perineal fistula after surgery for rectal cancer	- avoidance of a perineal evisceration and healing of the chronic suppuration	1

the mobilization technique was always made intra-operatively after the visualization of the vascular arcades of the omentum (*Fig. 1*). We most often used the Barkow's arcade (*Fig. 2*) and the left epiploic vessels – 13 cases, the right epiploic vessels – 5 cases and the left gastro-epiploic arcade – 3 cases. All the procedures were performed using an open approach (median laparotomy). The perineal wound was closed per primam in all the cases with primary APRR (separate late resorbable stitches for the muscles and adipose tissue, non-resorbable stitches for the skin). In one patient with a complex entero-perineal fistula the perineal wound was left open, and the final healing was achieved through secondary epithelization after the failure of a skin graft.

Statistical Analysis

Data were collected using Microsoft Excel Datasheets and statistical analysis (descriptive data – ranges, mean and median values) was performed using the GraphPad Prism software (www.graphpad.com).

Results

Mortality and general complications. In this series of patients, we encountered one postoperative death through myocardial infarction on postoperative day 12. Significant general complications were encountered in patients: bronchopneumonia – 1 case, cardiac failure requiring positive inotrope support – 1 case and renal

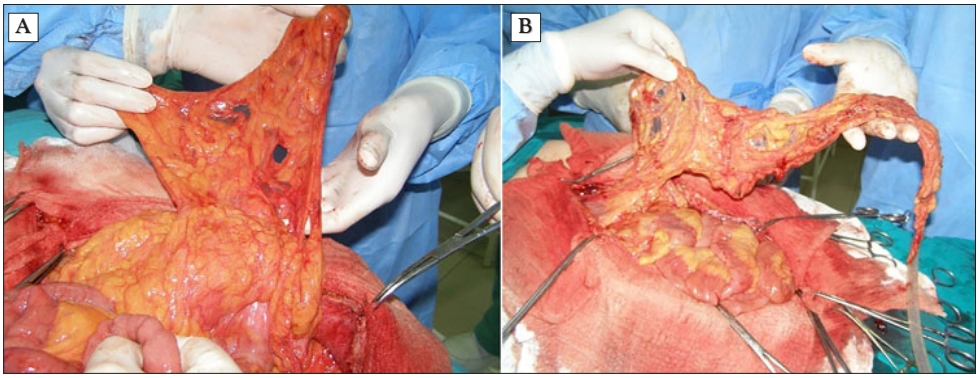


Figure 1. Exposure of the omentum with evaluation of the anatomy **(A)** and mobilization of the OF flap based on the left gastro-epiploic, epiploic vessels and Barkow's arcade **(B)**.

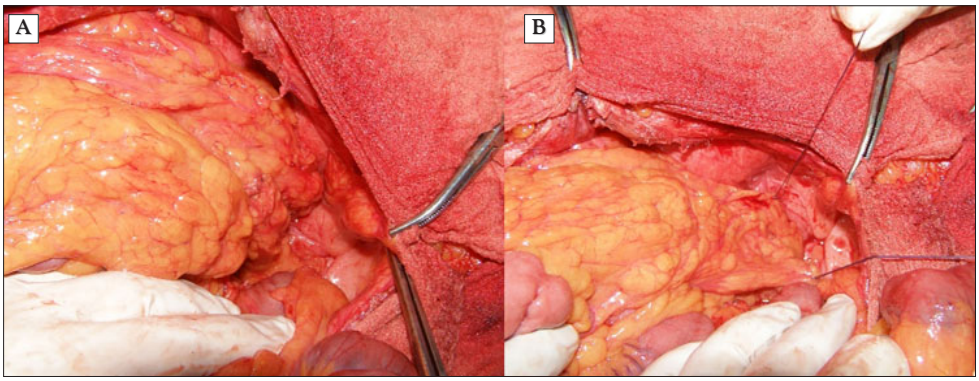


Figure 2. Insertion of the OF **(A)** and complete filling of the pelvi-subperitoneal space after abdomino-perineal resection **(B)**.

failure requiring intensive diuretic support – 1 case.

Hospitalization ranged between 4 and 41 days, with a median of 8 days. All the patients were discharged with no need for significant medical support.

Local complications were represented by 2 wound suppurations (abdominal – 1 case, perineal – 1 case). Both cases were solved by local toilet with no reoperation.

The time required for the regain of transit after surgery ranged between 2 and 7 days, with a mean of 3.5 days.

The viability of the flap was assessed by visual inspection at the end of the procedure and indirectly by the postoperative evolution. Other more sophisticated and objective techniques for intraoperative evaluation of the vascular perfusion of the flap (intraoperative Doppler ultrasound or indocyanine green fluorescence) were not available. We had no perioperative flap ischemia and no early postoperative complication related to the use of the omentum, but we must mention that we used this flap only in cases with a favorable anatomy.

The time required for mobilization of the OF was not specially recorded, but it ranged between 10 and 20 minutes in all the patients.

The late follow-up was made at intervals between 2 and 8 years, the main findings being:

- 5 deaths through distant metastases (+ two patients lost from follow-up);
- 2 cases of local recurrence (one with complete removal after re-laparotomy and dissection of the omental flap);
- no reoperation for intestinal obstruction;
- 2 cases of incisional hernia solved by retrorectus polypropilene mesh placement.

Postoperative computed-tomography scans were available in 18 patients, being performed mostly in the context of oncological evaluation/ treatment and or other health problems. In all the cases they showed a viable flap with no residual spaces, abscesses or presacral sinuses. Of note CT scans were not performed with the primary aim of evaluating the OF and were revised by both a radiologist and a surgeon.

Overall, we encountered no early or late postoperative complication (*Tables 2* and *3*) which could be directly related to the use of the OF for coverage / filling of the pelvi-subperitoneal remnant space after APRR. The mobilization of the OF is easy and safe and does not require a time-consuming process. The use of the OF does not seem to have a significant impact on the operative time and on the postoperative recovery.

Discussions

The use of well vascularized flaps is now recognized as a method to achieve healing of various lesions which are otherwise difficult to treat and other options are not available or are less successful (6-9). Although it is located inside the upper part of the peritoneal cavity

Table 2. Details about the immediate postoperative outcome

Parameter	Results (no./ranges/mean/median)
Mortality (no. cases / total)	1/21
General postoperative complications (no. cases / total)	3/21 - bronchopneumonia – 1 case* - cardiac failure – 1 case* - renal failure – 1 case*
Local complications (no. cases / total)	2/21** - perineal wound suppuration – 1 case - abdominal wound suppuration – 1 case
Time required for the regain of transit (days)	- ranges: 2 and 7 days - mean: of 3.5 days
Hospitalization (days)	- ranges: 4 and 41 days - median: 8 days

*only the cases that required prolonged antibiotic treatment, major inotropic support or intense diuretic support were recorded;
**solved by local toilet, no major reoperation

Table 3. Details about the late postoperative outcome

Parameter	No. of cases / total	Observations
Deaths	5/21	- distal metastases at the moment of death - 2 patients lost from follow-up
Local recurrence	2/21	- one case with complete excision (re-laparotomy + OF dissection)
Incisional hernia	2/21	- solved by Rives-Stoppa repair
Intestinal obstruction	0	

with closed attachments to the stomach and the transverse colon, the omentum may be mobilized as a well vascularized flap and used at significant distances. The omentum is frequently used by surgeons from various specialties for dealing with difficult lesions – including post-operative complications, being considered by Micheau as "an extreme flap for extreme situations" (10). Its mobilization requires an approach of the abdominal cavity through laparotomy or laparoscopy but otherwise this flap is easy to mobilize and does not involve a significant supplementary morbidity while its plasticity allows its application on a great variety of defects (10-12). To note that Prof. Ion Chiricuta from Cluj-Napoca, Romania had a major contribution in understanding the surgical anatomy of the epiploon, in the development of the surgical techniques for harvesting and in the popularization of this peculiar flap for solving a great variety of defects (13).

The use of the OF in rectal surgery is a matter of debate with controversial results (14,15). Several studies have showed benefits from its use for the filling / closure of the perineal space that remains after abdomino-perineal rectal resection (16,17). In a multi-center study involving 165 patients, Hay et al. (1997) conclude that pelvic omentoplasty favors the healing of the perineal wound (18). In a meta-analysis involving a total number of 891 patients, Killeen et al. (2013) conclude that the mobilization of the omental flap to reach the remnant space after APRR leads to a reduction of the rate of complications at the level of the perineal wound, with no significant increase of the post-operative morbidity or of the operating time (19).

There are no data concerning the late survival impact of the use of the OF after APRR for cancer. It is obvious that omentoplasty by itself does not increase the radicality of the procedure (extension of the resection and / or lymph node resection) so we cannot expect an improved oncological outcome. However, the use of the OF after APRR for cancer may have an indirect benefic late survival impact by reducing the postoperative complications, thus allowing a faster postoperative adjuvant treatment which must be frequently postponed in cases with perineal wound problems. Another possible advantage is a certain protection of the small bowel in patients who undergo postoperative radiotherapy.

Omentoplasty has been also recommended for solving other complex pelvic defects, alone or in association with various prosthetic materials and / or the vacuum assist closure technology (20-22). The mobilization of the omentum may also be performed with good results using a laparoscopic approach so that this technique may be used by experienced surgeons during laparoscopic APRR (23,24).

In our study the decision to use the OF was always made intraoperative based on the findings concerning both the pelvic defect and the anatomy of the omentum. In cases with unfavorable anatomy (damaged omentum and / or dense adhesions from previous surgery, short omentum with poor vascular arcades) we have preferred to abandon this technique. As mentioned above, we used very frequent the epiploic vessels and the Barkow's arcade. In cases with a favorable anatomy, we found that the mobilization of the OF to reach the pelvis can be made in less than 10-20 minutes, without a significant increase of the total operating time. Although extensive dissections of the vascular arcades are possible and allow an increase of the length and volume of the OF (13), we believe that they are time consuming and associated with a certain risk of flap ischemia and should not be associated with a major procedure such as APRR.

This study is a retrospective single-center analysis; the patients were not randomized and the decision to use was always made intraoperatively by the operating surgeon (PVHB). Another important aspect is that it involves a small number of cases with quite heterogenous lesions which have in common the remnant space after the APRR which was covered / filled using an OF mobilized through a non-extensive dissection. For these reasons, we cannot make a strong recommendation for its routine use in all the patients undergoing this procedure. In the available literature we were not able to find clear prospective randomized trials to evaluate this technique and reach very clear conclusions (16, 25-34). However, the fact that the OF may be mobilized very easily and quickly, the reduced morbidity and the absence of immediate or late complications directly related to this particular flap are strong arguments to support its use after APRR.

Conclusions

The OF is a viable and simple solution for the prevention and treatment of the complications related to the pelvi-subperitoneal space remaining after APRR; its use is not associated with a significant supplementary morbidity. It may be used during the primary procedure of APRR or as a solution for some postoperative complications and secondary / tertiary prophylaxis.

Conflicts of Interest

The authors declared no potential conflicts of interest.

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