



## Za prakso

### *Practice*

## *Laparoscopic technique for right hemicolectomy*

### Laparoskopska desna hemikolektomija

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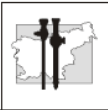
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#### **Abstract**

*Removal of both benign and malignant lesions of the distal ileum, cecum, ascending colon and hepatic flexures can be managed by right colectomy. This article focuses upon the technical issues of laparoscopic right colonic resection, which involves complete mobilization of the terminal ileum and right colon to the level of midportion of the transverse colon. Patient preparation for laparoscopic right colectomy is identical to that used for the open procedure and the patient is placed in a normal or lithotomy position. Insertion of three of the four trocars used depends on the patient's body habitus, type of resection and operative findings. Vascular isolation done through the windows in the mesocolon is recommended before colon mobilization. A harmonic scalpel is used for ileocolic mobilization to provide improved haemostasis. Retraction is facilitated by using the companion port, thereby allowing the surgeon to use a two-handed technique. After the entire colon has been mobilized, vascular ligation and anastomosis are made extracorporeally for the laparoscopic-assisted technique. Extension of the umbilical incision and entrance into the peritoneal cavity is facilitated by incising along the shaft of the trocar. Application of a small drape for wound protection is mandatory before withdrawing the port, grasper and cecum as one unit. The rest of the specimen is removed, and there follows safe and rapid division of the vascular supply and bowel anastomosis outside the peritoneal cavity. Currently, the laparoscopic-assisted method is favoured over the total intracorporeal approach because the latter is more technically demanding and time-consuming, less cost-effective and less safe, and carries an increased risk of contamination.*

**Key words.** Right hemicolectomy, laparoscopy, operative technique.



## Izveček

Z desno hemikolektomijo lahko odstranimo benigne in maligne spremembe distalnega ileuma, cekuma, ascendentnega kolona in hepatične fleksure. V prispevku je prikazana tehnična izvedba laparoskopske resekcije desnega kolona z mobilizacijo terminalnega ileuma in desnega kolona do sredine prečnega kolona. Priprava bolnika za laparoskopsko desno hemikolektomijo je enaka kot za odprto operacijo. Bolnik je na operacijski mizi v normalnem ali litotomijskem položaju. Tri do štiri trokarje uvedemo na mestih, ki so odvisna od bolnikove konstitucije, vrste resekcije in najdbe pri operaciji. Pred mobilizacijo kolona je priporočljivo izolirati žile preko okna, narejenega v mezokolon. Uporaba harmoničnega skalpela pri ileokolični mobilizaciji pripomore k izboljšani hemostazi. Retrakcijo olajšamo z uporabo dodatnega trokarja, tako da kirurg lahko uporablja obe roki. Ko je kolon mobiliziran, se pri laparoskopsko asistirani operaciji žile ligirajo in pa se naredi anastomoza zunajtelesno. Povečanje incizije umbilikalno in vstop v peritonealno votlino je olajšan z rezom ob trokarju. Preden hkrati izvlečemo trokar, prijemalke in cekum je treba zaščititi operativno rano. Nato odstranimo še ostali del preparata, prekinemo žilno preskrbo in naredimo anastomozo zunaj peritonealne votline. Laparoskopsko asistirana metoda ima prednost pred popolnim znotrajtelesnim posegom, ker je ta poseg tehnično zahtevnejši, traja dalj časa, je dražji, manj varen, poveča pa se tudi možnost okužbe.

**Ključne besede.** Desna hemikolektomija, laparoskopija, operativna tehnika.

The role of laparoscopic colon resection in the treatment of colon cancer is still a subject of debate. Right hemicolectomy is generally considered to be technically more challenging than operations on the left colon.

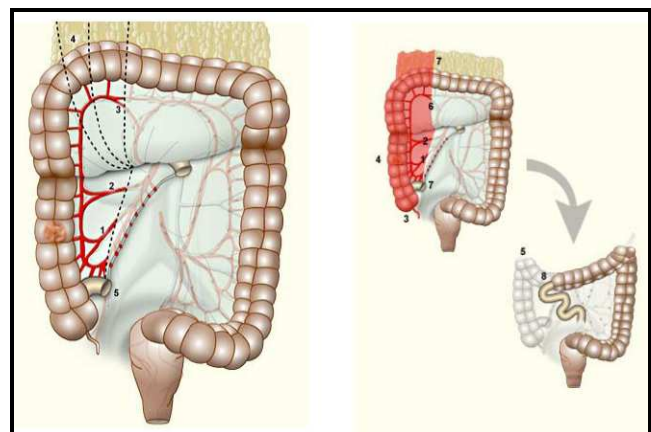
### *Surgical strategy*

Hemicolectomy (particularly the right-sided one), which currently accounts for approx.20% of all laparoscopic resections for colorectal carcinoma, is generally considered to be technically more demanding than operations on the sigmoid colon and rectum.

Nevertheless, thanks to the patho-anatomic abnormalities, such as the easily attainable mobility of the affected colon, and a relatively simple externalisation and anastomosis techniques, a laparoscopically assisted minimally invasive right hemicolectomy has become established as the elective standard therapy, superior to sigmoid resection.

Operations on the colon, the classical domain of tumour surgery, adhere to the well-established principles of oncological radicality, and this should also apply to the laparoscopic procedure. A significant correlation has been found between

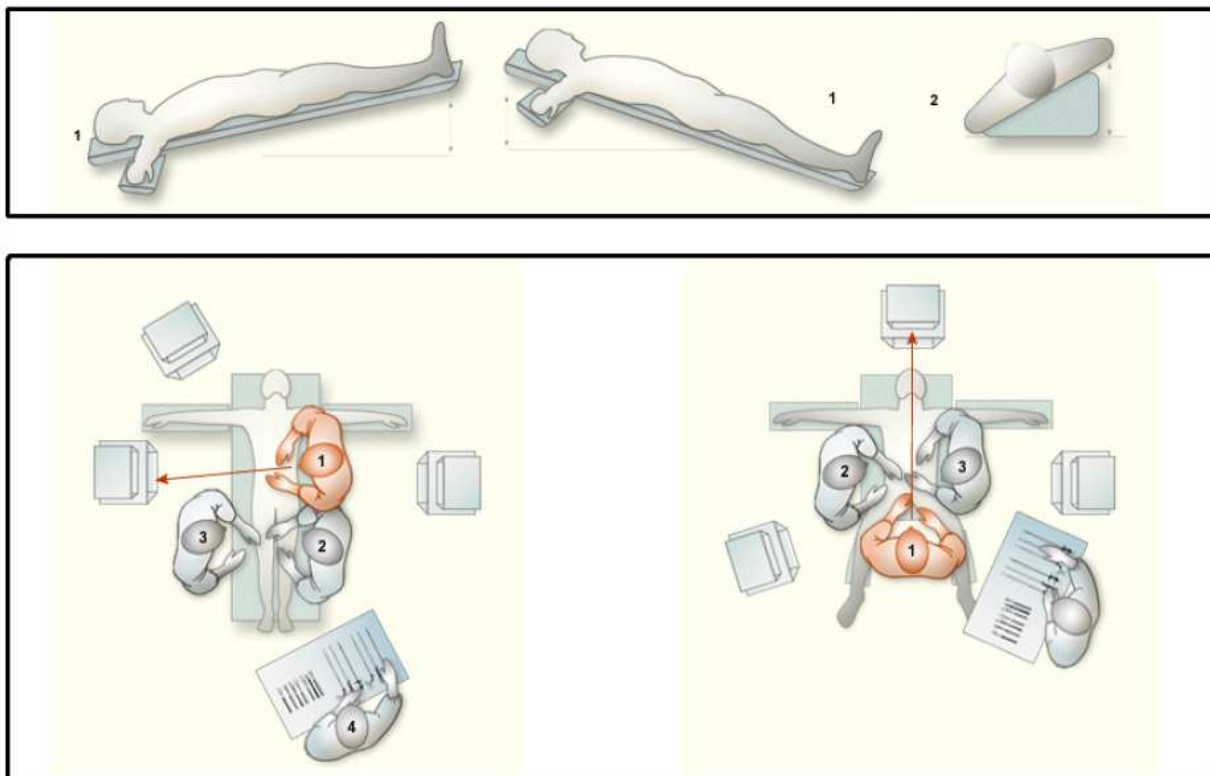
healing, long-term success rate and patient safety, on the one hand, and quality of the operation performed, on the other.



**Figure 1**

### *Technical conditions for surgery (Patient's and surgeon's position)*

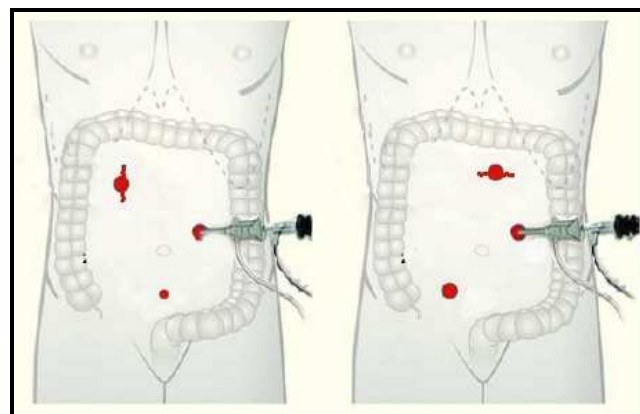
To ensure a free access to the mesenteric root, the upper body of the patient should be slightly lowered (Trendelenburg position) and the ileo-caecal region is thus exposed (Figure 2a).



**Figure 2**

The small intestine is displaced into the left upper abdomen. In order to achieve optimal visualisation during the mobilisation of the right colon flexure, the patient should be placed in a normal horizontal position so that the small intestine, the transverse colon and the omentum are displaced left-caudally. The upper body is then slightly raised (anti-Trendelenburg position) while retaining the leftward inclination of the operation table.

With a clear view over the segment of intestine to be resected, the surgeon stands to the side of the patient, while the assistant holding the camera (first assistant) stands next to him on the left side (Figure 2b). The surgeon bi-manually operates the instruments inserted through the upper and lower abdominal portals, while the first assistant operates the telescope introduced paraumbilically on the left. The extended right hemicolectomy requires a lithotomy positioning, so that the surgeon can carry out the entire upper abdominal preparation bi-manually from the caudal direction.



**Figure 3**

An ideal position for the camera trocar is provided when the telescope is brought close enough to the area to be resected, and visualisation of the entire operation area is provided. The pneumoperitoneum is established with the so-called open technique.



Figure 4

### Access route

For the standard laparoscopic right hemicolectomy, two working channels and the access portal for the telescope are needed (Figure 4). Optionally, a trocar may be inserted for accommodating the retraction instruments.

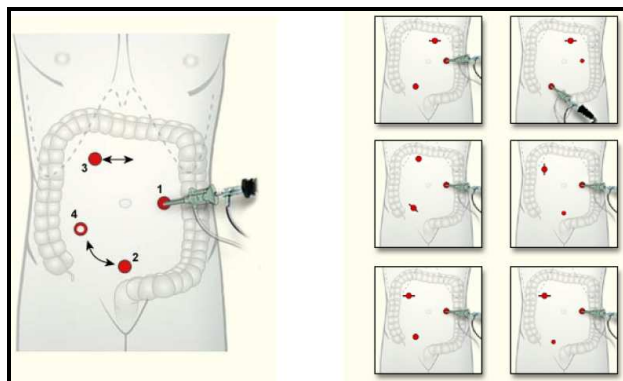


Figure 5

The location and width of the portals, as well as the direction and extent of the minilaparotomy required for exteriorisation of the preparation should be adapted to accommodate the individual abdominal site (Figure 5), the colonic abnormality, the size of the resectate, and the instruments to be used. Maximum visibility should always be provided.

### Mobilisation

Operative steps:

- Exploration
- Lymphovascular procedures
- Mobilisation of the right flexure

In patients with a confirmed carcinoma, the no-touch isolation technique should be used for the laparoscopic procedure; it involves vascular ligation to prevent lymph leakage prior to other mobilisation steps. For lymphadenectomy to be carried out simultaneously with the resection of the vascular stem, the laterally running ileocolic/right colic arteries and the branches of the superior mesenteric artery are sought out, exposed and amputated using a window technique (Figure 6).

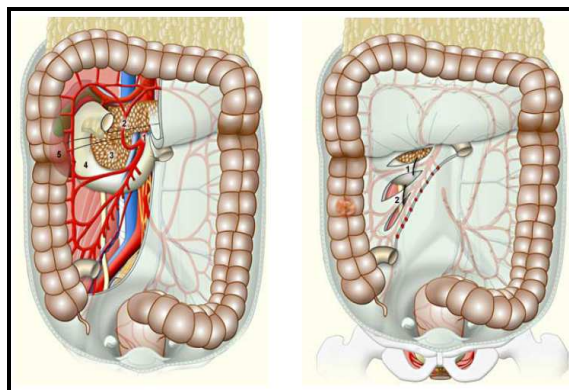


Figure 6

Here the variability of the vessels should always be taken into consideration. For the extended hemicolectomy, truncal ligation of the middle colic artery must also be carried out. Resection of the vascular bridges is performed using a linear stapler-cutter, or after occlusion by applying clips or the LigaSure vessel sealing system.

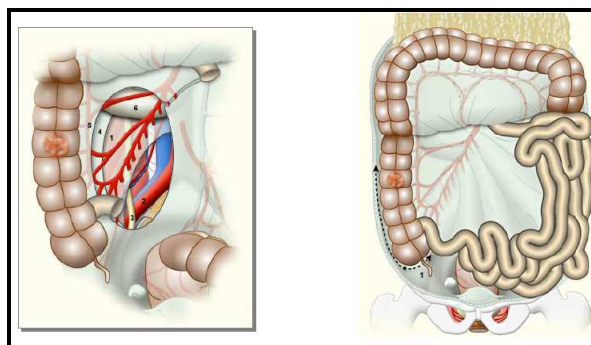
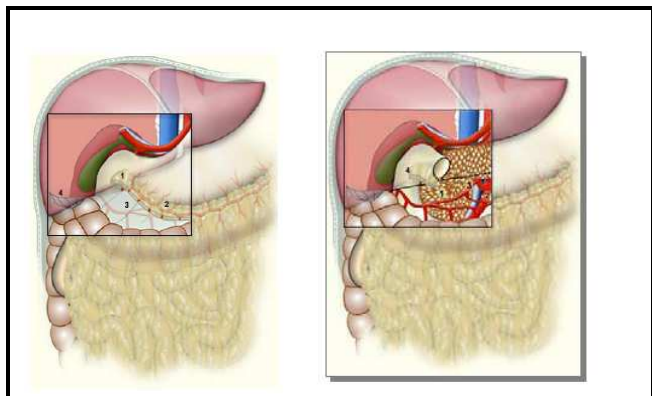


Figure 7





Detachment of the ileocecum from the retroperitoneal site, proceeding in the cranial and medial directions, is the first step of mobilisation in patients with no malignancy of the right colon.



**Figure 8**

With mobilisation of the right flexure of the large bowel, the status of the colomesenteric segment is changed, and caudal dissection of the flexure is more difficult because of intestinal loops hindering visualisation.

### ***Exteriorisation and resection***

Exteriorisation of the continuously uninterrupted tubular preparation should be done in a proper plane of dissection so that the colon limb, which should be eviscerated, can be guided out of the enlarged trocar incision in a tension-free manner. The minilaparotomy performed should be wide enough to accommodate the preparation, as no compression or traction should be exerted on the colon segment, especially when it bears a tumour. After complete mobilisation of the right-sided colon to be resected, the pneumoperitoneum is desufflated, the trocar is removed, and the incision is extended for minilaparotomy. Exteriorisation of the preparation is carried out through a foil ring introduced into the minilaparotomy. The intestinal convolution is carefully displaced and placed in front of the abdominal roof in order to avoid torsion and excessive pulling of the tissue at the exit point.

The direction of blood perfusion in the area of the planned section line is checked, and, when necessary, skeletonisation of the arcade vessels is accomplished outside the abdomen.

The omentum is partially resected outside the abdomen and then the preparation can be moved in a conventional manner using two clamps

### ***Anastomosis***

All wounds are protected, and the pneumoperitoneum is released through the trocars in a controlled manner. After exteriorisation of both bowel ends, mesenteric orientation should be maintained at all times for a proper anastomosis. The wound margins are cleaned, and the termino-terminal ileotransversostomy is prepared manually by applying a continuous single-row layered suture. Because of the incongruity of the ileal and colon lumens, this anastomosis can be occasionally more easily fashioned with interrupted single-layer sutures.

When using mechanical sutures with staplers it is possible to create a functional end-to-end anastomosis. Two cut ends of the bowel (either open or stapled closed) are placed side by side with their blind ends beside each other. If the bowel ends are closed, an enterotomy must be made in each loop of the bowel to allow insertion of the stapler. A cutting linear (GIA) stapler is then used to fuse the two bowel walls into a single septum with two double staggered rows of staples, and to create a lumen between the two bowel segments by dividing this septum between the rows. A noncutting linear (TA) stapler is then used to close the defect at the apex of the anastomosis where the GIA stapler was inserted. An alternative, and cheaper, method of closing the defect is to use a continuous suture. Before closing the apex the cut and stapled edges of the bowel should be inspected for the adequacy of hemostasis. Some authors recommend cauterizing these edges to ensure hemostasis; however, given that electrical current may be conducted along the metallic staple line to the rest of the bowel, it is probably easier and safer simply to underpin bleeding vessels with a fine absorbable suture. It is also important to offset the two inverted staple lines before closing the apex. A direct end-to-end, or terminolateral ileocolic anastomosis can be performed using an EEA stapler. The mesenteric slit can also be fixed by means of single button sutures when necessary.