

## MINIREVIEW

# EXTENDED VISCERAL RESECTIONS FOR LOCALLY ADVANCED RIGHT SIDED COLONIC TUMORS – A LITERATURE MINIREVIEW

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### ABSTRACT

Colon cancer represents one of the most common malignancies reported worldwide, which is best managed through surgery, followed by adjuvant oncologic treatment. Although local invasion of the adjacent viscera is more frequently revealed in left sided and rectosigmoid tumors, this event might be also encountered in the right sided tumors, imposing extended multivisceral resections in order to achieve a good control of the disease. This is a literature minireview regarding the necessity of performing extended surgical procedures for cases diagnosed with right sided colonic tumors.

**Keywords:** right side colon cancer, local invasion, extended resections.

### RÉSUMÉ

**Réseptions viscérales étendues des tumeurs malignes du côlon du côté droit localement avancées- revue de la littérature**

Le cancer du côlon représente l'une des tumeurs malignes les plus répandues dans le monde, qui est mieux gérée par une intervention chirurgicale suivie d'un traitement oncologique adjuvant. Bien que l'invasion locale des viscères adjacents soit plus fréquemment révélée dans les tumeurs du côté gauche et rectosigmoïdes, cet événement pourrait également être rencontré dans les tumeurs du côté droit, imposant des résections multiviscérales étendues afin d'assurer un bon contrôle de la maladie. C'est une minirevue de la littérature concernant la nécessité d'effectuer des interventions chirurgicales étendues pour les cas diagnostiqués avec des tumeurs coliques droites.

**Mots-clés:** cancer du côlon du côté droit, invasion locale, résections étendues.

## INTRODUCTION

Although colon cancer is one of the most commonly encountered malignancies worldwide, the eventuality of local invasion has been described in 5.5 up to 16.7% of all tumors and is usually reported in the sigmoid and rectal tumors, due to the close connection with the adjacent pelvic structures; when it comes to the right sided tumors, local invasion has been rarely described<sup>1</sup>. Although in cases presenting left sided colon or rectosigmoid tumors with invasion of the surrounding viscera extended resections have been commonly performed, cases diagnosed with right sided colonic tumors and duodenal or pancreatic invasion remain a real challenge for the surgeon, due to the high morbidity which might be induced after performing an en bloc resection at this level<sup>2,3</sup>. The first author who reported the necessity of performing a pancreatoduodenectomy for locally invasive colonic cancer was Van Prohaska in 1956<sup>4</sup>. Since that moment, other few case series have been reported, demonstrating that pancreatoduodenectomy can be safely associated to right colectomy in order to achieve a good control of the disease<sup>5,6,7</sup>.

## TECHNICAL ASPECTS

Once the laparotomy is performed, both the invasion and the resectability of the tumor are assessed. Although in certain cases macroscopically only adhesions between the tumor and the surrounding viscera are initially seen, the histopathological studies demonstrated that in 55% up to 70% of cases these adhesions have malignant infiltration<sup>3,8,9</sup>. Although an inflammatory origin of these adhesions cannot be always excluded, most authors discourage any attempt of dissecting them, in order to diminish the risk of tumoral spread and, secondarily, the risk of local recurrence. There are studies which demonstrate that, in cases in which a more conservative approach is tempted, the risk of early recurrence ranges between 70-100%, while the 5-year survival rates seem to decrease from 40-61% to 0-23%. Therefore, in most cases en bloc resection is advocated.

In cases diagnosed with right colonic cancer and pancreatic or duodenal invasion, the resectability is evaluated after mobilization of the tumor en bloc with the right colon and with the pancreatic head (after performing a Kocher maneuver). Most often, the surgical procedure continues by dissecting the superior mesenteric vessels in order to exclude the vascular invasion. The procedure continues by performing the right colectomy en bloc with pancreatoduodenectomy, with or without pylorus preservation<sup>5</sup>.

## INTRAOPERATIVE AND EARLY POSTOPERATIVE OUTCOMES

Although adjacent organ invasion in patients with right side colonic cancer is sometimes diagnosed intraoperatively, the histopathological studies demonstrate, in a significant number of cases, the presence of well differentiated tumors and the absence of lymphatic metastases, suggesting in this way that these tumors rather behave like locally aggressive neoplasms, with low risk of developing distant metastases. This fact is extremely important as a predictive factor for the long term outcome of these patients; whenever lymphatic or hematogenous spread is suspected, the rate of recurrence significantly increases<sup>8,10</sup>. For example, in Kapor's study conducted on 11 patients with right side colonic adenocarcinomas with pancreatic invasion, both patients who developed recurrent disease presented lymph node metastases at the time of the initial surgery<sup>7</sup>. In Zhao's study, published ten years later, similar results regarding the influence of lymph node metastases were reported<sup>6</sup>.

The most relevant studies which revealed the effectiveness and the short term outcomes after extended resections for locally advanced right sided colonic carcinomas are summarized in Table 1.

When it comes to the long term outcomes, Zhao et al analyzed the correlation between tumor characteristics and overall survival and demonstrated that, in univariate analysis, the overall survival was significantly influenced by the presence of lymph node metastases and by the invasion of other viscera such as liver, gallbladder or parietal invasion. In the meantime, age at diagnosis, gender, tumor diameter, as well as the presence of kidney invasion, did not seem to influence the overall survival. According to the same study, the patients presenting lymph node metastases at the time of diagnosis reported a significantly lower rate of long term survival when compared to those with no lymphatic spread (the one year and three year survival rate were 56% and 37% respectively for patients with lymph node metastases, versus 91% and 71% respectively for patients with no lymphatic spread)<sup>6</sup>. The short term and long term outcomes after extended resections for locally invasive right sided colonic adenocarcinomas are shown in Table 2.

## CONCLUSIONS

All these data come to demonstrate that local invasion of duodenum, pancreatic head or liver involvement should not preclude performing an extended resection in patients with locally invasive right sided colonic tumors<sup>5,7,11</sup>. The studies published so far come to demonstrate the effectiveness and safety of these procedures, as well as the benefits in regard to the long term survival.

**Table 1.** Studies revealing the effectiveness of extended resections for locally advanced right sided colonic tumors.

Author, year	No of patients	Performed surgical procedures	Median operative time (hours)	Median blood loss (ml)	Median number of units of blood transfusion	Histological type	Lymph node metastases
Berrosopi, 2002 <sup>5</sup>	3	PPPD – 2 cases RH – 3cases PD – 1 case LR – 1 case	7,4 (range 7-9,5 hours)	300 (range 150-800 ml)	1 (range 0-2 units)	- Moderate differentiated colonic adenocarcinoma – 2 cases - Undifferentiated colonic adenocarcinoma – 1 case	0
Zhao, 2015 <sup>6</sup>	21	PD – 21 cases N – 4 cases AWR – 4 cases LR, GR – 8 cases	NR	NR	NR	- Low differentiated colonic adenocarcinoma – 12 cases - High differentiated colonic adenocarcinoma – 9 cases	42% of cases
Kapoor, 2005 <sup>7</sup>	11	PD – 5 cases PD and N – 1 case DR – 3 case DG, GR – 1 case LR – 1 case	6,9 (range 3,5-9 hours)	550 (range 300-1400 ml)	NR	- Well differentiated colonic adenocarcinoma – 7 cases - Moderately differentiated colonic adenocarcinoma – 4 cases	NR

Legend. PPPD: pylorus preserving pancreatoduodenectomy, PD – pancreatoduodenectomy, RH – right hemicolectomy, LR – liver resection, N- nephrectomy, AWR- abdominal wall resection, GR- gallbladder resection, DR – duodenal resection.

**Table 2.** Short term and long term outcomes after extended resections for locally invasive right sided colonic adenocarcinomas.

Author, year	30 days postoperative morbidity	30 days postoperative mortality	Length of hospital in stay	Disease free survival	Overall survival (OS)
Berrosopi, 2002 <sup>5</sup>	33% (one case of postoperative pneumonia)	0	Range 12-19 days	No evidence of disease at 116, 10 and 30 months respectively	NR
Zhao, 2015 <sup>6</sup>	NR	NR	NR	NR	1 year OS – 75% 3 year OS – 56% 5 year OS – 43%
Kapoor, 2005 <sup>7</sup>	18% (ileo-colic anastomotic leak in one case and pancreateojejunostomy leak in the second case)	9% (one case)	10 days (range 9-74 days)	54 months	NR

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