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## **Anastomosis leak rate after right hemicolectomy. Literature review**

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### **Abstract**

**Review purpose:** The aim is to review historical and prospective studies results of anastomotic leaks (AL) after right hemicolectomy (RH) and ileocolic anastomosis.

**Methods:** Detailed literature review of articles published in 2002-2019 was performed using PubMed, Cochrane database and Google Scholar search system. Keywords used in the search: right colectomy, right hemicolectomy ileocolic anastomosis, leak, dehiscence, abscess, peritonitis.

**Results:** The historical studies state, that RH is considered a safe operation with low anastomotic leak rates up to 2-4%. Recent studies suggest AL after RH range from 8% to 9%. Studies have shown a higher chance of AL after stapled anastomosis (5,4 – 8,5%) versus hand sewn anastomosis (2,4 – 7,4%). Other risk factors such as Crohn's disease, side-to-side versus end-to-end anastomosis, single layer versus double-layer anastomosis, intraabdominal versus extra-abdominal anastomosis should be considered. Intraoperative testing reduces the rate of postoperative leakage.

**Conclusions:** AL rate after RH is high, and this surgery is not as safe as it seemed to be. Patient comorbidities and underlying pathologies should be taken into consideration before performing RH. Intraoperative AL identification should be used to reduce the complication rate.

**Keywords:** Anastomosis leak, right hemicolectomy, ileocolic anastomosis.

## 1. Introduction

Right hemicolectomy (RH) (including ileocaecal resection) is the most common colonic resection. It is performed in both elective and emergency settings, and for neoplastic and non-neoplastic conditions. Postoperative anastomotic leakage (AL) remains one of the most threatening and potentially lethal complications in gastrointestinal surgery. Nowadays surgeons realize that right hemicolectomy is not as safe as it seemed to be. Our aim is to review historical and prospective studies results of anastomotic leaks after right hemicolectomy and ileocolic anastomosis.

## 2. Historical anastomosis leak percentage

We have done a thorough literature research and found some of the oldest publications associated with anastomotic leaks. Studies included anastomotic leaks after elective and emergency right hemicolectomy that needed surgical treatment. Studies from 2003 have shown, that the percentage of AL after RH was about 3%. Results suggested that resection and primary anastomosis can be performed with acceptable morbidity and mortality in a high proportion of cases of emergency large bowel obstructions. (1) Other studies from the same year have shown that the percentage of AL was 2,5%. This specific study included over 750 patients, which underwent laparoscopic colon or rectal procedures. The results state, that laparoscopic colon and rectal surgery in the hands of well-trained surgeons can be performed safely with short hospital stay, low analgesic requirements and acceptable complication rates. (2) The historical studies state, that RH is

considered a safe operation with low anastomotic leak rates up to 2-4%.

## 3. Prospective studies leak percentage

On the other hand, new studies suggest quite a different result. During recent years many multicentric retrospective and prospective studies have been done and the results are quite worrying. The AL after RH range from 8% to 9%. A study from May 2019 states, that anastomotic leak occurred in 8,9% of minimal invasive colectomy (laparoscopic and robotic surgeries) and in 11,1% of open surgeries. (3) Even though this study concentrated on minimally invasive (in specific – robotic surgery) the AL results are significant. Another prospective study from 2018 included over 1300 patients undergoing stapled, side-to-side ileocolic anastomoses. The overall anastomotic leak rate was 8,3%. (4) The newest studies create doubt that after all RH is not as safe as it might seem.

## 4. Anastomosis leakage risk factors

Many factors are known to be associated with anastomotic leak including patient comorbidity, underlying pathology and anastomotic technique. Studies have shown a higher chance of AL after stapled anastomosis versus hand sewn anastomosis. A prospective study from 2017 included 3208 patients whom underwent colorectal surgery. The overall anastomotic leak rate was 8,1%, which was similar following hand sewn (7,4%) and stapled (8,5%) techniques. The study found that stapled anastomosis was associated with an increased AL rate comparing it with hand sewn anastomosis. (5) Another retrospective cohort study from 2019, which included 1414 patients,

found out that AL is also higher in stapled (5,4%) versus hand sewn (2,4%) anastomosis. (6)

Another risk factor for AL is Crohn's disease. In 2019 a prospective study was published which has shown, that AL after RH in patients with Crohn's disease is 8,8%. (7) Also, in other studies we see, that the AL rate is also higher in reoperated patients with Cohn's disease (5% of AL detected in patients with no previous intestinal resection and 17% detected in patients with a history of previous intestinal resection). (8)

There are also other risk factors that should be considered: side-to-side versus end-to-end anastomosis, single layer versus double layer anastomosis, intraabdominal versus extraabdominal anastomosis.

### 5. Anastomosis testing

Many intraoperative tests to assess the gastrointestinal anastomoses exist. Yet, there is still a lack of standardization which of these tests should be chosen in a routine clinical practice. Tests that evaluate the integrity of anastomosis consists of 1) Air-leak test; 2) Intraluminal saline test; 3) Methylene blue dye tests; 4) Intraoperative endoscopy test. Tests that are used to evaluate the perfusion of the anastomosis: 1) Doppler ultrasound; 2) Laser Doppler flowmetry; 3) Scanning laser Doppler flowmetry; 4) Tissue oxygen tension; 5) Near-infrared spectroscopy; 6) VLS; 7) Transanal narrow band imaging (NBI); 8) ICG fluorescence angiography; 9) Sidestream darkfield imaging (SDFI); 10) Laser speckle contrast imaging (LSCI). Despite the lack of well-designed studies with properly selected control there are sufficient amount of data showing that intraoperative testing reduces the rate of postoperative leakage.

In our opinion, these tests should be standardized and used in everyday practice.

### 6. Conclusions

ALs remain a huge challenge despite many surgical and technological advances. As the studies show, AL rate after RH is high, and this surgery is not as safe as it seemed to be. Patient comorbidities and underlying pathologies should be taken into consideration before performing RH. Also, improved early intraoperative AL identification is essential for the successful management of this threatening complication.

### 7. Declarations

The author declares no conflict of interest. This research received no external funding

### 8. Literature

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