

## CLINICAL OUTCOMES OF REVERSAL OF HARTMANN'S PROCEDURE

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**Background.** Reversal of Hartmann's procedure (HP) is one of the most complex surgical interventions in abdominal surgery with high morbidity rates of up to 58% in the patients after HP and mortality of up to 3.6%.

**Objective.** This was a retrospective observational study to analyze the Hartmann's reversal (HR) outcomes.

**Methods.** The study involved 31 patients (16 males and 15 females), average age  $59.6 \pm 10.31$  (range 26-80), who underwent HR at Ternopil Regional Hospital in 2010 - 2021. The reasons for the HP were: cancer in 20 (64.5%) cases, perforation of the diverticulum – 6 (19.3%), traumatic rupture – 3 (9.7%) and Crohn's disease - 2 (6.4%) cases.

**Results.** Median time from Hartmann's procedure to reversal was  $11.13 \pm 9.24$  months (interval 3-38). Intraoperative time was  $210.33 \pm 56.91$  minutes (range 120-330). HR was performed in 30 (96.8 %) patients. Dense pelvic adhesions of the stump of the rectum was diagnosed in 13 (41.9%) patients. Hand-sewn anastomosis was performed for 22 (71%) patients, stapler anastomosis – 4 (12.9%), pull-through technique – 3 (9.7%) patients. AL occurred in 3 (9.7%) patients on the 15<sup>th</sup>, 23<sup>rd</sup> and 35<sup>th</sup> postoperative days. pseudomembranous colitis was diagnosed in 2 (6.4%) patients with AL. The mortality rate was 1 (3.3%) as a result of septic complications due to AL; this case was not operated by a colorectal surgeon due to administrative issue in the hospital.

**Conclusions.** Hartmann's reversal is still one of the most difficult operations in colorectal surgery with high incidence of postoperative complications. Sound selection of patients with low comorbidity and in suitable time period is crucial for successful HR.

**KEYWORDS:** Hartmann's procedure; reversal; anastomotic leakage.

### Introduction

A century has passed since Henry Hartmann firstly performed the widely known operation, but it has not lost its relevance and is frequently used around the world to prevent anastomotic leakage (AL), which remains an eternal problem in colorectal surgery [1]. Reversal of Hartmann's procedure (HP) is one of the most complex surgical interventions in abdominal surgery with high morbidity rates of up to 58% in the patients after HP and mortality of up to 3.6% [6, 8]. Multifactorial technical difficulties particular to reversal include dense pelvic adhesions, pelvic infection, adhesions, difficulty in identification of rectal stump and performing of colorectal anastomosis with short rectal stump [1, 7]. As a result, more than two-thirds of patients remain with a permanent stoma following Hartmann's procedure, either due to inability to perform reversal or due to anastomotic leak and stoma

restoration [1, 6, 7]. The majority of ostomy patients become socially and psychologically maladapted need to manage the physical and psychological challenges associated with a stoma [7].

### Methods

This was a retrospective observational study to analyze the Hartmann's reversal (HR) outcomes. The study involved thirty-one patients (16 males and 15 females) of average age  $59.6 \pm 10.31$  (range 26-80), who underwent HR at Ternopil Regional Hospital in 2010-2021. The median BMI was 25.2 (range 18-39). Most of the patients (80.6 %) had an ASA score 3-4. Median time from Hartmann's procedure to reversal was  $11.13 \pm 9.24$  months (interval 3-38). Intraoperative time was  $210.33 \pm 56.91$  minutes (range 120-330). Blood loss was  $331.67 \pm 191.4$  ml (range 150-1000). The reasons for the HP were: cancer in 20 (64.5%) cases, perforation of the diverticulum – 6 (19.3%), traumatic rupture – 3 (9.7%) and Crohn's disease – 2 cases (6.4%) (Table 1).

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Quantitative variables were calculated with the median. All calculations were performed using the Statistica 64 software.

### Results

HR was performed for 30 (96.8 %) patients. Mobilization of the splenic flexure was performed for 5 (16.1%) patients. Dense pelvic adhesions of the stump of the rectum was diagnosed in 13 (41.9%) patients. Hand-sewn anastomosis was performed for 22 (71%) patients, stapler anastomosis – 4 (12.9%), reduction – 3 (9.7%) patients. paracolostomy hernia was diagnosed in 7 (22.6%) patients. The mean hospital stay was  $14.03 \pm 11.3$  days (interval 7-62).

AL developed in 3 (9.7%) patients on the 15<sup>th</sup>, 23<sup>rd</sup> and 35<sup>th</sup> postoperative days (Table 2). pseudomembranous colitis was diagnosed in 2 (6.4%) patients with AL. 1 patient after HR was affected with Covid-19 on the 12<sup>th</sup> postoperative day, probably it was one of the major favorable factors of AL development which was diagnosed on the 35<sup>th</sup> postoperative day due to systemic infection and reducing the reactivity of the immune system. The mortality rate was 1 (3.3%) as a result of both sepsis and purulent peritonitis due to AL; this case was not operated by a colorectal surgeon due to administrative issue in the hospital.

### Discussion

Adequate patient selection and preoperative planning are extremely important for HR pro-

cedures to reduce the risk of postoperative complications [1]. Patients with a benign disease, aged under 69 years old and with low comorbidity are more likely of undergoing HR [6, 8]. In our study AL was diagnosed in 3 (9.7%) patients aged 63-80 years old and ASA score 3-4.

Chronic infection (cured abscess and infected pelvis infiltratis) is one of the major factors influencing HR outcome and usually creates technical difficulties during surgery in the form of dense pelvic adhesions [4, 7]. These challenges made performing HR impossible in one patient in our study.

One of the important factors is the optimal interval between HP and HR. According to the literature the best time to perform HR is at least 6 months after the surgery [5, 7]. In our study the interval between HP and HR was  $11.13 \pm 9.24$  months (interval 3-38), however, such results were obtained by inclusion of 3 patients, who underwent HR at 36-38 months after HP. Other authors show that timing of surgery (more than 6 months) do not affect surgical complications rate or severity or the length of hospital stay [5]. In the study paracolostomy hernia was evidenced in 7 (22.6%) patients, nevertheless at the same time it did not increase the complication rate.

Laparoscopic HR has significant privilege under open HR with less short-term complications regarding the overall morbidity, less frequency of wound infection and postoperative ileus [2, 3].

**Table 1. Indications for Hartmann's procedure**

| Indications for Hartmann's procedure | n  | %    |
|--------------------------------------|----|------|
| Colorectal cancer                    | 20 | 64.5 |
| Perforation of the diverticulum      | 6  | 19.3 |
| Traumatic rupture                    | 3  | 9.7  |
| Crohn's disease                      | 2  | 6.7  |

**Table 2. Analasis of patients with AL**

| Clinical data/patients      | 1           | 2                 | 3           |
|-----------------------------|-------------|-------------------|-------------|
| Age                         | 80          | 63                | 69          |
| Sex                         | female      | female            | female      |
| Indications for HP          | perforation | colorectal cancer | perforation |
| Months between HP and HR    | 4           | 14                | 13          |
| Relaparotomy                | +           | +                 | +           |
| AL on ... postoperative day | 15          | 23                | 37          |
| Hand-sewn anastomosis       | +           | +                 | +           |
| Pseudomembranous colitis    | -           | +                 | +           |
| Covid-19                    | -           | -                 | +           |
| Hospital discharge/death    | 19(death)   | 42                | 56          |

## Conclusions

Hartmann's reversal is still one of the most difficult operations in colorectal surgery with a high incidence of postoperative complications. Sound selection of patients with low comorbidity and in period of 6-12 months after HP is crucial for successful HR.

## Conflict of Interests

Authors declare no conflict of interest.

## Authors' Contributions.

Ihor Dzyubanovsky – conceptualization, writing – reviewing and editing; Anatoliy Bedeniuk – methodology, formal analysis; Stepan Grytsenko – investigation, data curation, writing – original draft.

## КЛІНІЧНІ РЕЗУЛЬТАТИ ЗАКРИТТЯ СТОМИ ПІСЛЯ ОПЕРАЦІЇ ГАРТМАНА

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ТЕРНОПІЛЬСЬКИЙ НАЦІОНАЛЬНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ ІМЕНІ І. Я. ГОРБАЧЕВСЬКОГО МОЗ УКРАЇНИ,  
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**Вступ.** Закриття стоми після операції Гартмана є однією з найскладніших хірургічних втручань в абдомінальній хірургії з високим рівнем захворюваності до 58% і смертністю до 3,6%.

**Мета.** Це ретроспективне обсерваційне дослідження з метою аналізу клінічних результатів закриття стоми після операції Гартмана.

**Методи.** Тридцять один пацієнт (16 чоловіків та 15 жінок) із середнім віком  $59,6 \pm 10,31$  років (діапазон 26-80), які проходили курс лікування у Тернопільській обласній лікарні з 2010 по 2021 рік. Причинами операції Гартмана були: рак у 20 (64, 5%) випадків, перфорація дивертикула – 6 (19,3%), травматичний розрив – 3 (9,7%) та хвороба Крона – 2 (6,4%).

**Результати.** Середній час між операцією Гартмана та реконструктивно-відновною операцією становив  $11,13 \pm 9,24$  місяця (інтервал 3-38). Інтраопераційний час становив  $210,33 \pm 56,91$  хв (діапазон 120-330). Реконструктивно-відновну операцією виконано у 30 (96,8 %) пацієнтів. Щільні тазові спайки кишки прямої кишки діагностовано у 13 (41,9%) хворих. 22 (71%) пацієнтам накладено ручний анастомоз, степлерний анастомоз у 4 (12,9%), низведення у 3 (9,7%). Неспроможність анастомозу виникла у 3 (9,7%) пацієнтів на 15, 23 та 35 добу після операції. У 2 (6,4%) хворих з неспроможністю анастомозу діагностовано псевдомембранозний коліт. Летальність у 1 (3,3%) випадку внаслідок септичних ускладнень зумовлених неспроможністю анастомозу, цей випадок неоперований колоректальним хірургом.

**Висновки.** Закриття стоми після операції Гартмана залишається однією з найскладніших операцій в колоректальній хірургії з високим відсотком післяопераційних ускладнень. Правильний відбір пацієнтів з низьким рівнем супутньої патології та в правильний період часу є важливим ключем до успішного виконання реконструктивно-відновної операції.

**КЛЮЧОВІ СЛОВА:** операція Гартмана; закриття стоми; неспроможність анастомозу.

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