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Incisional hernia after ovarian debulking surgery

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ABSTRACT

Objectives: The purpose of our study was to explore the incidence and contributing variables of an incisional hernia after debulking surgery for advanced ovarian cancer.

Material and methods: The imaging of patients who underwent debulking surgery with an extended vertical incision was re-evaluated for incisional hernias at one-year follow-up, and their medical records were reviewed. We performed univariate and multivariate analysis to find out the risk factors for an incisional hernia.

Results: The overall annual incidence of incisional hernia was 26.7 percent (46 of 172). Univariate analysis revealed a statistically significant relationship between age, body mass index (BMI), and the length of the incision and the incidence of an incisional hernia. The only factor identified by multivariate analysis as being independently related with the development of an incisional hernia within a year of the operation was BMI (OR 1.12, 95% CI 1.01–1.25, p = 0.04).

Conclusions: Incisional hernia rates were high after ovarian cancer surgeries, and BMI was the independent factor significantly linked to hernia formation. To reduce the high ratio of incisional hernia among these group of patients, preventative strategies should be researched and applied.

Keywords: incisional hernia; ventral hernia; ovarian cancer; cytoreductive surgery

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INTRODUCTION

Incisional hernia occurs after laparotomy at a rate of 5–20%, and up to 43% in high-risk individuals [1]. The risk of an incisional hernia is influenced by some variables of surgical technique and patient characteristics such as age, chronic pulmonary disease, anemia, the type of surgery, postoperative coughing, wound infection, obesity, hypoalbuminemia & poor nutrition, sepsis, chronic glucocorticoid therapy, ascites, chemotherapy and malignancy [2]. To know these factors are important for counselling both before and after surgery.

In recent years, maximal cytoreductive surgery has become cornerstone treatment of ovarian cancer, and to accomplish it, generally an extended midline incision is required [3]. Patients with cancer appear to have a larger baseline risk of developing a hernia after surgery than patients having surgery for benign conditions. However, there are few studies examining incisional hernia in patients underwent surgery for ovarian cancer [4–6].

Our study's goal was to investigate the incidence and factors connected to the development of an incisional hernia after debulking surgery for ovarian cancer.

MATERIAL AND METHODS

After the ethics committee approved the study (institution review board number: E-29624016-050.99-907831), retrospective data was collected from single centre's medical records of the patients underwent cytoreductive surgery for advanced disease of ovarian cancer (also peritoneal and tubal cancers were included and accepted as ovarian cancer), at Gynaecological Oncology Department, between January 2017 and December 2021.

Participants aged over 18 years were included. Patients who had a history of incisional or umbilical hernia before

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the surgery and patients who were lost during the follow-up within 12 months of the operation, were excluded. Patients who had a relaparotomy due to complications such as anastomotic leak and whose fascia was not closed, were also excluded.

Preoperative mechanical bowel preparation was used in all patients. Antibiotic prophylaxis was given, and we used povidone-iodine for antisepsis of the skin. The team of gynaecological oncologic surgeons (gyn-oncology team consisted of 8 surgeons, two surgeons performed each surgery: one was a senior/consultant and the other was a fellow) performed all the operations through a midline laparotomy. Laparotomy was performed with a scalpel for skin incision, extending from the pubic symphysis to the xiphoid process; followed by diathermy in cut mode for the subcutaneous tissue. A little section of fascia was opened with a scalpel and then cut with scissors. The preperitoneal fat was bluntly dissected from the peritoneum by sweeping the index finger. Once it was marked, the peritoneum was raised with forceps and opened longitudinally with scissors. For exploration, a Thompson retractor was used. At the end of the surgery, we used a continuous-suture technique with tissue bites of approximately 8 mm every 8 mm for closing the fascia with slowly absorbable monofilament loop suture, polydioxanone (PDS) no 1. Subcutaneous tissue was closed with absorbable multifilament polyglactin no 2–0 and skin was closed with metal staples. A drain was put in a Douglas pouch. Subcutaneous drains were not used.

Until the patients were discharged, all wounds were examined daily. Patients were asked to use an abdominal corset for six weeks postoperatively. The metal staples were removed between the 14^{th} and 21^{st} postoperative day. Patients were followed up every 3 months according to our ovarian cancer follow-up protocol, and magnetic resonance imaging (MRI)/computed tomography (CT) scan was performed in the first year after the surgery. We reviewed their reports that had been evaluated by radiologists. And the imagings were double-checked by a gyn-oncologist. Demographic characteristics, preoperative serum albumin levels, the American Society of Anaesthesiology (ASA) score of patients, type of surgery, intraoperative details, the duration of hospital stay and early (within 30 days) postoperative complications including infection, evisceration were noted. Those who received preoperative chemotherapy regardless of primary or recurrent surgery were considered neoadjuvant chemotherapy. A wound infection was described as pus discharge. The presence of wound dehiscence without evisceration was also considered a sign of wound infection. All imaging (CT or MRI) performed within the first year of follow up, were reviewed and if a fascial defect along the incision (larger than 1 cm) was detected, it was noted as an incisional hernia.

Patients still alive were called for the purpose of measuring the incision length and informed consent was obtained.

The Statistical Package for the Social Sciences (SPSS) 21.0 version was used for all statistical analyses. Comparison of categorical variables were performed using exact Fisher's test and Yates continuity correction. After the normality of variables were examined by Shapiro–Wilk test, comparisons of continuous variables were compared using an independent-samples T-test or Mann–Whitney U test. P values < 0.05 were considered statistically significant. Data were expressed as mean ± standard deviation (SD) or median and interquartile range (IQR) for continuous variables, and absolute numbers and percentages for categorical values. Multivariate logistic regression was performed for the variables that were significant in the univariate analysis.

RESULTS

One hundred seventy-two patients were included for analysis. Thirty-seven of the patients (21.5%) were operated for recurrence, the rest were operated for primary ovarian cancer at advanced stage. Forty-one of the 122 patients (23.8%) received neoadjuvant chemotherapy. All patients received chemotherapy (platinum-based regimen) postoperatively, three refused to complete treatment and four interrupted due to toxicity. Hyperthermic intraperitoneal chemotherapy (HIPEC) was administered to a total of eleven patients. Sixteen patients (9.3%) had remaining implants that were greater than 1 cm.

The total incidence of incisional hernia during a year time was 26.7% (46 of 172). Table 1 and 2 display the characteristics and operative details of the patients according to whether an incisional hernia is present (or not).

Of all patients, mean age was 53.1 ± 12.1 years and median body mass index (BMI) was 28 kg/m^2 (IQR 24–33). Of the 69 patients we could measure, median incision length was 30 cm (IQR 27–32). According to a univariate analysis, an association between age, BMI, the length of the incision and the development of an incisional hernia was found statistically significant. After include age, BMI, the length of the incision into a multivariate logistic regression model, BMI was the only factor that was independently linked to the development of an incisional hernia within a year of surgery [odds ratio (OR) 1.12; 95% confidence interval (CI) 1.01–1.25, p = 0.04]. The outcomes of the multivariate analysis are listed in Table 3.

DISCUSSION

Incisional hernia rate in our series were slightly higher than those reported in the literature. The high-risk group (*e.g.*, perioperative chemoradiation and malnutrition) and surgical characteristics (major surgical procedures and extensive incision length; xiphoid-pubic distance with

Table 1. Characteristics of patients			
	Patients with incisional hernia (n = 46)	**Patients without incisional hernia (n = 126)**	**p value***
Age [y]	55.9 ± 10.5	51.7 ± 13.2	0.04
Parity	2 (1–8)	2 (1–6)	0.18
BMI [kg/m^2]	30.8 (25–33)	26.5 (23.5–32)	< 0.001
Smoking, n [%]	3 (6.5)	17 (13.5)	0.12
Neoadjuvant chemotherapy, n [%]	15 (32.6)	26 (20.6)	0.22
Postmenopausal, n [%]	30 (65.2)	79 (62.7)	0.91
Preoperative serum albumin level [mg/dL]	3.86 ± 0.61	3.85 ± 0.67	0.47
ASA score (3–4), n [%]	13 (28.3)	18 (14.3)	0.1
Diabetes mellitus, n [%]	9 (19.6)	11 (8.7)	0.15
Hypertension, n [%]	12 (26.1)	33 (26.1)	0.99
Ascites, n [%]	44 (95.7)	121 (96)	0.99
History of midline incision, n [%]	17 (36.9)	32 (25.4)	0.31

*p ≤ 0.05 is regarded as statistically significant. Statistical significance was calculated using exact Fisher's test (smoking, ascites) and Yates continuity correction [menopausal status, neoadjuvant chemotherapy, American Society of Anaesthesiology (ASA) score, diabetes, hypertension, history of midline incision] for categorical variables. P values for continuous variables were calculated using Mann–Whitney test [parity, body mass index (BMI)] and independent-samples t test (age and serum albumin level)

Table 2. Operative data of patients			
	Patients with incisional hernia (n = 46)	**Patients without incisional hernia (n = 126)**	**p value***
Type of incision, n [%] Transumbilical Periumbilical	 20 (43.4) 26 (56.6)	 56 (44.4) 70 (55.6)	0.99
Incision length [cm]	30 (27–32) n = 21	28.5 (26–30.8) n = 48	0.03
Suboptimal cytoreduction, n [%]	3 (6.5)	13 (10.3)	0.16
HIPEC, n [%]	4 (8.7)	7 (5.5)	0.26
Duration of surgery [min]	225 (165–290)	270 (190–330)	0.08
Bowel resection, n [%]	10 (21.7)	38 (30.2)	0.50
Stoma, n [%]	5 (10.9)	19 (15.1)	0.35
Hospitalization period [day]	7 (5–9)	6 (4–8)	0.94
Wound infection, n [%]	6 (13)	9 (7.1)	0.59
Surgical site infection (except the wound), n [%]	5 (10.9)	7 (5.5)	0.29

*p ≤ 0.05 is regarded as statistically significant. Statistical significance was calculated using exact Fisher's test [cytoreduction, hyperthermic intraperitoneal chemotherapy (HIPEC), surgical site infection] and Yates continuity correction (type of incision, bowel resection, stoma, wound infection) for categorical variables. P values for continuous variables were calculated using Mann–Whitney test (incision length, duration of surgery, hospitalization period)

Table 3. Multivariate logistic regression			
	OR	**95% CI**	**p value**
Age	1.00	0.947–1.06	0.89
BMI	1.12	1.01–1.25	0.04
Incision length	1.11	0.90–1.37	0.32

OR — odds ratio; CI — confidence interval; BMI — body mass index

a median of 30 cm) could be an explanation of the overall incisional hernia rate. Moreover, since we considered any gap in the fascia as a hernia in CT scan/MRI images, there is no situation that could underestimate hernia rates with physical examination as in other studies. In 2016, Guitarte et al. [4] reported 16 (6.3%) incisional hernias among the 252 patients, 28% of whom had ovarian cancer. In that retrospective study, incisional hernias were only discovered through physical examination, and the mean BMI of the patients was 35.9 kg/m^2, which might have impeded examination-based detection. According to Long et al. [5], after primary laparotomy for ovarian cancer, the first-year hernia rate was 8.8% (21/239) and the second-year hernia rate was 23.4% (39/167). One of the main limitations of that study was the fact that not all included patients underwent radiological examination and that the authors do not specify, the number of hernias diagnosed by CT scan or physical examination. They found a significant relationship between BMI and the development of incisional hernias in both the first and second years, which was compatible with our findings. They also discovered intraperitoneal chemotherapy to be significant for the first-year hernias and advanced stage for the second-year hernias. All the patients in our series had advanced disease, and eleven of them received HIPEC treatment; the results were not significantly different. HIPEC was discovered to be an independent factor linked to the development of an incisional hernia in patients with peritoneal surface cancers treated by cytoreduction and HIPEC, according to a retrospective analysis [7]. Spencer et al. [6] found 9.8% of patients (n = 265) and an additional 7.9% of patients (n = 189) developed hernias in the first and second years, respectively. Poor nutritional status and suboptimal cytoreduction were independent predictors for the creation of first-year hernias, while age was the sole factor linked to the development of incisional hernias for the second year. In our research, age was identified as a risk factor by a univariate test, however multivariate modelling invalidated this finding. Poor nutritional status and suboptimal cytoreduction were not associated with the occurrence of an incisional hernia.

The typical risk variables for incisional hernia reported by general surgeons [2], apart from BMI, were not found to be relevant in our series. The physical and nutritional health of cancer patients is worse. Malignancy and chemotherapy can deteriorate the process of tissue repair [7]. Even though preoperative ASA score and the albumin serum levels of our patients were not statistically different, it would be incorrect to assess their condition solely based on these. Additionally, because of major surgery, prolonged operation time may impair the surgeon's performance, which could result in a less-than-ideal abdominal closure.

It is known that suture: wound length ratio and closure technique (*e.g.*, size of the bite) are crucial for hernia development [8, 9], which were not well documented in our medical records. The STITCH trial [9] demonstrated that in comparison to suturing with the traditional large bites (10 mm) approach, continuous small bites (5 mm) suturing of the fascia after abdominal midline incision lowers the incidence of incisional hernia. They used PDS 2-0 with a 31 mm needle for small bites and double loop PDS 1 with a 48 mm needle for large bites. Five hundred sixty patients at surgical and gynaecological departments were randomized and at one year follow-up, 57 (21%) of 277 patients in the large bites group and 35 (13%) of 268 patients in the small bites group had incisional hernia (p = 0.0220, covariate adjusted odds ratio 0.52, 95% CI 0.31–0.87; p = 0.0131). They stated that three-quarters of patients received radiological imaging during follow-up. We used loop sutures (PDS 1) to close each laparotomy. Guitarte et al. [4] reported that incisions closed with loop suture had a hernia risk that was more than five times higher than those closed without loop suture.

The prevention of incisional hernias by prophylactic mesh augmentation may have a significant impact for high-risk patients. Due to concerns over mesh infection and consequences, surgeons are hesitant to use prophylactic mesh, but studies did not show an increased risk of surgical-site infection [10, 11]. The European and American Hernia Societies stated in their guidelines: Prophylactic mesh augmentation after elective midline laparotomy can be considered to reduce the risk of incisional hernia [12]. On the other hand, studies on the use of mesh after cytoreductive surgeries are insufficient. It is controversial whether it is rational to use it in cases as ovarian cancer which has a high recurrence rate and necessitates repeated surgeries.

The strengths and limitations

Our study's disadvantages were its retrospective design and, accordingly, the lack of data about detailed closure technique and ratio of suture length to wound length. To minimize the bias brought forth by various surgical closure methods performed by different surgeons and avoid the heterogeneity of closure techniques, we restricted our search to the years 2017–2021 to ensure that all surgeries were performed by the same team. The absence of identification of the chemotherapeutic drugs, particularly bevacizumab, which was found to deteriorate wound healing and expedite the development of incisional hernias [5], was another weakness of our investigation. To our knowledge, this is the study with the highest number of patients among the studies in which ovarian cancer surgery was performed with a midline incision between the xiphoid-pubis. The main strength of our study was that all individuals who completed follow-up underwent imaging. This procedure prevented underestimation of the number of patients with incisional hernia, because radiological examination is more sensitive than physical examination alone.

CONCLUSIONS

Women who had ovarian cancer surgery were found to be at a high risk of developing incisional hernias. The sole variable that was significantly associated to the development of hernias was BMI. Incision should be closed by a skilled surgeon and should be treated with the same seriousness as all other surgical procedures. Focus should be placed on risk-reducing strategies as continuous small bite technique and prophylactic mesh augmentation.

Article information and declarations

Ethics statement

The study was approved by University School of Medicine Ethics Committee (institution review board number: E-29624016-050.99-907831).

Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by HYC, MMC and HMB. The first draft of the manuscript was written by HYC and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

HYC: Conception of the work, manuscript writing, analysis and interpretation of data.

MMC: Acquisition of data and literature research.

HS: Manuscript editing and conception of the work.

HMB: Acquisition of data and literature research.

YS: Manuscript editing and conception of the work.

ST: Manuscript editing and conception of the work.

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Conflict of interest

The authors declare that they have no conflict of interest.

Supplementary material

None.

REFERENCES

1. Baucom RB, Ousley J, Beveridge GB, et al. Cancer Survivorship: Defining the Incidence of Incisional Hernia After Resection for Intra-Abdominal Malignancy. Ann Surg Oncol. 2016; 23(Suppl 5): 764–771, doi: 10.1245/s10434-016-5546-z, indexed in Pubmed: 27743227.
2. van Ramshorst GH, Nieuwenhuizen J, Hop WCJ, et al. Abdominal wound dehiscence in adults: development and validation of a risk model. World J Surg. 2010; 34(1): 20–27, doi: 10.1007/s00268-009-0277-y, indexed in Pubmed: 19898894.
3. Colombo N, Sessa C, du Bois A, et al. ESMO-ESGO Ovarian Cancer Consensus Conference Working Group. ESMO-ESGO consensus conference recommendations on ovarian cancer: pathology and molecular biology, early and advanced stages, borderline tumours and recurrent disease†. Ann Oncol. 2019; 30(5): 672–705, doi: 10.1093/annonc/mdz062, indexed in Pubmed: 31046081.
4. Guitarte C, Grant J, Zhao H, et al. Incisional hernia formation and associated risk factors on a gynecologic oncology service: an exploratory analysis. Arch Gynecol Obstet. 2016; 294(4): 805–811, doi: 10.1007/s00404-016-4100-3, indexed in Pubmed: 27101367.
5. Long KC, Levinson KL, Diaz JP, et al. Ventral hernia following primary laparotomy for ovarian, fallopian tube, and primary peritoneal cancers. Gynecol Oncol. 2011; 120(1): 33–37, doi: 10.1016/j.ygyno.2010.09.015, indexed in Pubmed: 20947151.
6. Spencer RJ, Hayes KD, Rose S, et al. Risk factors for early-occurring and late-occurring incisional hernias after primary laparotomy for ovarian cancer. Obstet Gynecol. 2015; 125(2): 407–413, doi: 10.1097/AOG.0000000000000610, indexed in Pubmed: 25568995.
7. Cascales Campos PA, González-Gil A, Gómez-Ruiz AJ, et al. Risk factors and management of incisional hernia after cytoreduction and hyperthermic intraperitoneal chemotherapy (HIPEC) in patients with peritoneal surface malignancies. Hernia. 2020; 24(2): 257–263, doi: 10.1007/s10029-019-01962-4, indexed in Pubmed: 31069579.
8. van Rooijen MMJ, Lange JF. Preventing incisional hernia: closing the midline laparotomy. Tech Coloproctol. 2018; 22(8): 623–625, doi: 10.1007/s10151-018-1833-y, indexed in Pubmed: 30094713.
9. Deerenberg EB, Harlaar JJ, Steyerberg EW, et al. Small bites versus large bites for closure of abdominal midline incisions (STITCH): a double-blind, multicentre, randomised controlled trial. Lancet. 2015; 386(10000): 1254–1260, doi: 10.1016/S0140-6736(15)60459-7, indexed in Pubmed: 26188742.
10. Jairam AnP, Timmermans L, Eker HH, et al. PRIMA Trialist Group. Prevention of incisional hernia with prophylactic onlay and sublay mesh reinforcement versus primary suture only in midline laparotomies (PRIMA): 2-year follow-up of a multicentre, double-blind, randomised controlled trial. Lancet. 2017; 390(10094): 567–576, doi: 10.1016/S0140-6736(17)31332-6, indexed in Pubmed: 28641875.
11. Depuydt M, Allaeys M, de Carvalho LA, et al. Prophylactic Mesh After Midline Laparotomy: Evidence is out There, but why do Surgeons Hesitate? World J Surg. 2021; 45(5): 1349–1361, doi: 10.1007/s00268-020-05898-0, indexed in Pubmed: 33558998.
12. Deerenberg EB, Henriksen NA, Antoniou GA, et al. Updated guideline for closure of abdominal wall incisions from the European and American Hernia Societies. Br J Surg. 2022; 109(12): 1239–1250, doi: 10.1093/bjs/znac302, indexed in Pubmed: 36026550.