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Original Article

Identification of risk factors for ileus after orthopedic surgery: A comparative study

Ortopedik cerrahiler sonrası görülen ileus için risk faktörlerinin araştırılması: Karşılaştırılmalı çalışma

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ABSTRACT

Aim: To examine the risk factors for postoperative ileus (POI) encountered after orthopedic surgery.

Material and Methods: A total of 53 patients who were operated on by orthopedics clinic and consulted to general surgery department during the postoperative period. . Considering the etiology of the consultation, the patients were divided into two groups: ileus (n: 34) and non-ileus (n: 19).

Results: The median age of the patients in the ileus group was 75.5 (26-95). Hypertension (HT) was the most common comorbid disease in patients in the ileus group (p=.001). Combined anesthesia was frequently preferred in the ileus group (p=.022). Lower extremity surgeries were performed more frequently in the ileus group (p=.007). The length of hospital stay was higher in the ileus group (p=.040). In terms of complications, according to the Clavien Dindo classification, grade 3b was more common in the ileus group (p=.039). As a result of the binary regression analysis performed to determine the risk factors for ileus; age (odds ratio (OR)) = 1.034,; 95% CI (1.004-1.065); p=.027), day 5 consultation ((OR) = 0.073; 95% CI (0.014-0.368); p=.002), and HT ((OR) = 7.042; 95% CI (2.017-24.589); p=.002).

Conclusion: If lower extremity surgery is to be performed, geriatric and HT patients should be alert for ileus.

Keywords: Ileus; postoperative period; orthopedics

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Öz

Amaç: Ortopedik cerrahi sonrası karşılaşılabilen post operatif ileusun risk faktörlerini incelemek.

Gereç ve Yöntemler: Ortopedi kliniği tarafından ameliyat edilen ve ameliyat sonrası dönemde genel cerrahi bölümüne konsülte edilen toplam 53 hasta çalışmaya dahil edildi. Konsültasyonun etiyolojisine göre hastalar ileus (n:34) ve ileus dışı (n:19) olarak 2 gruba ayrıldı.

Bulgular: İleus grubundaki hastaların ortanca yaşı 75,5 (26-95) idi. İleus grubundaki hastalarda en sık eşlik eden hastalık hipertansiyon olarak saptandı (HT) (p=.001). İleus grubunda kombine anestezi sıklıkla tercih edilmiş idi, (p=.022). Alt ekstremite cerrahileri ileus grubunda daha sık yapılmıştı (p=.007). Hastanede kalış süresi ileus grubunda daha yüksek bulundu (p=.040). Clavien dindo sınıflamasına göre komplikasyonlar açısından ileus grubunda grade 3b daha sıktı (p=.039). İleus için risk faktörlerini belirlemek için yapılan ikili regresyon analizi sonucunda; yaş (odss oranı (OR)) = 1.034,; %95 GA (1.004-1.065); p=.027), 5. gün konsültasyonu ((OR) = 0.073; %95 GA (0.014-0.368); p=.002) ve HT ((OR) = 7.042; %95 GA (2.017-24.589); p =0,002) olarak hesaplandı.

Sonuç: Alt ekstremite cerrahisi yapılacaksa geriatrik ve HT olan hastalar da ileus açısından hazırlıklı olunmalıdır.

Anahtar Kelimeler: İleus, postoperatif zaman, ortopedik cerrahi

Introduction

Postoperative ileus (POI) can be roughly defined as slowing or stopping gastrointestinal motility. POI can be complicated or non-complicated. If the ileus persists for less than three days, it is considered non-complicated, and if intestinal motility is inhibited for more than three days, it is considered complicated ileus.[1] It can cause various uncomfortable symptoms in patients such as nausea, vomiting, bloating, and abdominal pain. While POI is mainly seen after major abdominal surgery, it can also be seen after orthopedic surgery. Mainly because of the development of the health system, the fact that elderly patients can be operated on today causes us to encounter POI more frequently in these patient groups. It has been shown in some studies that it can be seen in the range of 0.3%-5.6% [1-4].

Colonic dysfunction has been identified as an essential risk factor for POI. Especially in the geriatric patient group, POI can seriously increase the length of stay and morbidity after surgeries performed because of severe slowing of bowel motility due to colonic dysfunction. In this context, laxatives or prokinetic drugs are given, although this has not been proven as a treatment in clinical use. However, if some potential risk factors for POI can be identified preoperatively in patients undergoing orthopedic surgery, and if some precautions and treatments for constipation can be given before surgery, it can be thought that the incidence of POI may decrease after orthopedic surgery. Therefore, our study investigated the risk factors for POI after orthopedic surgery.

Material and Methods

Among the 5462 patients operated on by the orthopedics clinic between 2015 and 2020, 53 patients who have consulted the general surgery department during the postoperative period were retrospectively scanned and included in the study. Considering the etiology of the consultation, the patients were divided into two groups: ileus (n: 34) and non-ileus (n: 19). In terms of demographic data of the patients, orthopedic surgical procedures applied, co-morbidities, ASA scores, type of anesthesia used, previous abdominal surgery history, length of hospitalization, day of hospitalization consulted, additional invasive or noninvasive procedures performed, and complications with Clavien- Dindo scores were compared between groups.

This study was approved by the local ethics committee and procedures were carried out in accordance with the 2013 Helsinki Declaration. Informed consents were obtained from all participants.

Statistical analysis

The Statistical Package for the Social Sciences for Windows version 24 software (IBM Corporation, Armonk, NY, USA) was used for statistical analysis purposes during the evaluation of the study results.

Descriptive statistics were expressed as numbers and percentages for categorical variables and mean ± standard deviation values for quantitative variables if the data were suitable for normal distribution or median values if they were not suitable for normal distribution, respectively. The normality

distribution of the data was evaluated using the Shapiro–Wilk test. In comparing quantitative measurements according to sociodemographic characteristics and study groups, the Mann Whitney-U test was used for evaluating two independent groups with data non-suitable for normal distribution. The comparison of proportions according to a study group and the evaluation of correlations were conducted using the chi-square test or Fisher's exact test.

Receiver-operating characteristic (ROC) curve analysis was performed to determine cutoff values for consultation time and age for ileus. Binary logistic regression analysis was performed to evaluate risk factors that may result in POI. During analysis, $P < .05$ was considered statistically significant.

Results

A total of 53 patients who were operated on by the orthopedics clinic between 2015 and 2020 and who were consulted by the general surgery department during the postoperative period were retrospectively scanned and included in the study. Of the patients, 64.1% (n: 34) were consulted for ileus, and 35.8% (n: 19) for reasons other than ileus. When we look at all orthopedic surgeries (n: 5462/34), we calculated the POI rate as 0.62%. The median age of the patients in the ileus group was 75.5 (26–95), while the non-ileus group was younger (70 (25–100), p=.041). While the ileus group was predominantly female (58.8%), the non-ileus group was mostly male (57.9%), p=.242). Demographic data and clinical results of the 53 patients included in the study are summarized in Table 1.

The most common comorbidity in patients was hypertension, which was more common in the ileus group (76.5%-31.6%, respectively, p=.001). Additionally, coronary artery disease was more common in the ileus group (23.5% p=.002). In both groups, patients were most frequently evaluated as ASA 2 in the preoperative evaluation (44.1%-47.4%, respectively, p=.093). While combined anesthesia was commonly preferred in the ileus group, general anesthesia was used more frequently in the non-ileus group (58.8%-57.9%, respectively, p=.022). There was a history of previous surgery in both groups, but it was found that this situation did not differ between the groups in terms of ileus (35.3%-47.4%, respectively, p=.389). In the ileus group, the median consultation time was 3 days, and in the non-ileus group, this time was determined as ten days (p=<.001). In the non-ileus group, the most common reason for consultation was acute cholecystitis (52.6%), followed by abdominal pain due to urinary tract infection (26.3%). ROC analysis was performed to find a cut-off value for ileus for consultation time. The ROC analysis curve revealed that consultation time was distinctive for ileus (p=.000). The area under the ROC curve (AUC) was found to be 0.825. This value indicates a high level of distinctiveness. The 95% confidence interval (CI) for the AUC was 0.701–0.949. Accordingly, the cut-off value separating the ileus group from the non-ileus group as consultation timing was found on the 5th day, the sensitivity was 89.5%, and the specificity was 63%.

Considering the surgeries performed, it is seen that lower extremity surgeries were performed more frequently in the ileus group (p=.007). The length of hospital stay was higher in the ileus group (respectively, 13–7, p=.040). In terms of complications, grade 1 was more common in the non-ileus group compared to the ileus group according to the Clavien Dindo classification (29.4%-52.6%, p=.039). In contrast, grade 3b was more common in the ileus group (respectively, 26.5%-10.5%, p=.039). Because the binary regression analysis was performed to determine the risk factors for ileus, age, consultation time, and HT were significant. It was determined that the other parameters examined were not determinative as risk factors (such as gender, previous surgery history, other comorbidities and anesthesia type, and preoperative ASA score). Because of regression analysis, age (odds ratio (OR)) = 1.034, respectively, as risk factors for ileus; 95% CI (1.004–1.065); p=.027), day 5 consultation ((OR) = 0.073; 95% CI (0.014–0.368); p=.002), and HT ((OR) = 7.042; 95% CI (2.017–24.589); p=.002). Additionally, ROC analysis was performed to find a cut-off value for ileus for age. The ROC analysis curve revealed that age was discriminatory for ileus (p=.041). The area under the ROC curve (AUC) was 0.67. This value indicates moderate discrimination. The 95% confidence interval (CI) for the AUC was 0.513–0.827. Accordingly, the cut-off value that separates the ileus group from the non-ileus group based on age was 71.5 years, the sensitivity was 67.6%, and the specificity was 57.9%.

Discussion

POI can usually be detected after major abdominal surgeries. This may increase the length of hospital stay, the development of complications, morbidity, and ultimately the cost [5,6]. However, POI can be seen not only after abdominal surgeries but also after lower extremity surgeries [7]. In our study, we determined the risk factors that will enable us to predict the POIs that can be seen after orthopedic surgeries and take the necessary precautions. According to our study, we had some significant results.

We encountered more ileus in those who had lower extremity surgery and those who preferred combined anesthesia. As

Table 1: Demographic Data of Study Groups				
		Ileus (n:34)	Non- Ileus (n:19)	p value
Age		75.50 (26-95)	70 (25-100)	.041†
Sex	Female	20 (58.8%)	8 (42.1%)	.242*
	Male	14 (41.2%)	11 (57.9%)	
Clavien Dindo	Grade 1	10 (29.4%)	10 (52.6%)	.039*
	Grade 2	4 (11.8%)	6 (31.6%)	
	Grade 3A	6 (17.6%)	0	
	Grade 3B	9 (26.5%)	2 (10.5%)	
	Grade 4A	5 (14.7%)	1 (5.3%)	
	Grade 4B	0	0	
	Grade 5	0	0	
Consultation time		3th day (1-55)	10th day (2-115)	<.001†
LOS		13 (4-77)	7 (2-36)	.040†
Comorbidities	HT	26 (76.5%)	6 (31.6%)	.001*
	CRF	5 (14.7%)	0	.079*
	DM	8 (23.5%)	4 (21.1%)	.836*
	CAD	8 (23.5%)	0	.022*
	PAF	4 (11.8%)	0	.120*
	Asthma	2 (5.9%)	0	.281*
	COPD	1 (2.9%)	0	.450*
	AF	2 (5.9%)	0	.281*
	CHF	2 (5.9%)	1 (5.3%)	.925*
ASA	ASA I	3 (8.8%)	5 (26.3%)	.093*
	ASA II	15 (44.1%)	9 (47.4%)	
	ASA III	9 (26.5%)	5 (26.3%)	
	ASA IV	7 (20.6%)	0	
	ASA V	0	0	
Type of Anesthesia	General	8 (23.5%)	11 (57.9%)	.022*
	Spinal	6 (17.6%)	3 (15.8%)	
	Combine	20 (58.8%)	4 (21.1.%)	
	Bloc	0	1 (5.3%)	
Previous Abdominal Surgery		12 (35.3%)	9 (47.4%)	.389*
Etiology	Femoral neck fracture	12 (35.3)	5 (26.3%)	.874*
	Gonaarthrosis	3 (8.8%)	2 (10.5%)	
	Coxarthrosis	1 (2.9%)	0	
	Lower extremity fractures	11 (32.4%)	8 (42.1%)	
	Others	7 (20.6%)	4 (21.1%)	
Surgery	Partial hip replacement	11 (32.4%)	2 (10.5%)	.007*
	Total knee replacement	3 (8.8%)	2 (10.5%)	
	Total hip replacement	4 (11.8%)	0	
	KR + PFNA	6 (17.6%)	1 (5.3%)	
	Debridmant	3 (8.8%)	0	
	External fixator	3 (8.8%)	1 (5.3%)	
	Amputation	2 (5.9%)	2 (10.5%)	
	ARIF	1 (2.9%)	3 (15.8%)	
	Closed reduction	0	1 (5.3%)	
	IMN	0	5 (26.3%)	
	Partial shoulder prosthesis	1 (2.9%)	0	
	Tumor excision	0	2 (10.5%)	
* Chi-squared test, † Mann Whitney-U test				

a result, patients with ileus are hospitalized more often and experience more complications related to it. (According to the Clavien Dindo classification, grade 3b was more common in the ileus group). Additionally, after the age of 71.5, each 1 year increases the probability of ileus by 1.034 times, and we found that the risk of ileus increases 7.042 times in patients with HT. We think that the increase of HT in the risk of POI is a coincidental situation rather than a pathophysiological effect.

If we look at the literature, it has been mentioned that opioid use and advanced age in the pre-operative and post-operative period may cause a slowdown on the gastrointestinal system [8]. Parvizi et al. also mentioned that especially regional anesthesia poses a risk in terms of POI after orthopedic surgeries [9]. According to Cha YH et al., they found a high rate (65%) of POI, especially after lower extremity surgery. For this reason, they mentioned that chewing gum can prevent POI [10]. However, also studies found POI at a lower rate after orthopedic surgery [9,11,12]. In our study, we found that POI was detected more frequently in patients who preferred combined anesthesia and in elderly patients. We found a lower rate of POI compared with the literature [9,11,12]. We think that the reason for this is that the use of opioids in patients undergoing combined anesthesia adversely affects intestinal peristalsis. Similarly, slowdowns in intestinal peristalsis due to advancing age in elderly patients may explain the POI rates in our study.

In the literature, different complications such as pneumonia, urinary tract infection and cholecystitis have been mentioned after orthopedic surgical procedures [13,14]. In the group that constituted the non-ileus group of our study, patients were mostly consulted to us because of acute cholecystitis. However, other complications may have seemed to be less frequent because general surgery was not consulted directly. In addition, when the complications related to POI in the ileus group were evaluated according to the clavien dindo classification, grade 3b was found to be high, which was also considered as an important finding.

In different studies, some recommendations have been made for preventing POI. These can be listed as supportive treatments such as appropriate intravenous (i.v.) fluid replacement, prevention of electrolyte imbalance, early initiation of oral intake and mobilization, and administration of prokinetic agents. In our clinic, we apply and recommend such supportive treatments, especially in patients who have undergone lower extremity surgery. In patients who we think may pose a risk of POI, especially in immobile elderly patients who are planned for lower extremity surgery, we recommend a diet 2, liquid-weighted pulp-free food and chewing gum, 2 days before the surgery and up to 1 week after the surgery.

There are some limitations of our study. There may have been some bias regarding the study design, since it was primarily a retrospective study and was selective in determining the study groups. Additionally, the reason why our POI rate is lower according to the literature is; We assume that among the total surgeries performed, some POI patients with ileus who were not consulted general surgery could be missed. For this reason, we think that a multicenter study, which is prospectively designed and subgroup surgeries are separated in detail, will determine more clear and accurate results in terms of POI after orthopedic surgery.

Conclusions

If lower extremity surgery is to be performed in geriatric, HT and patients with CAD, they should be prepared for ileus and it can be recommended to use laxatives that will not cause electrolyte imbalance, liquid-weighted fiber-free diet, prokinetic drug use and early mobilization to prevent dysmolytis before and after surgery.

Declaration of conflict of interest

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