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Urinary retention after elective cholecystectomy

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Abstract

Background: There are few reports about urinary retention rate after elective cholecystectomy. We designed a prospective study to assess the problem.
Methods: A total of 121 female and 19 male patients were included in the study with a prospective study protocol. Laparoscopic cholecystectomy was performed in 107 patients and open cholecystectomy in 33 patients.
Results: Neither gender nor age affected rate. Postoperative micturition difficulty developed in 10 patients. Of these patients, 9 could void with helping measures, and only 1 needed catheterization. Only 1 patient who underwent laparoscopic surgery required catheterization (0.7%). The open approach caused a higher incidence of postoperative micturition difficulty than did the laparoscopic approach (15.2% versus 4.7%; $P = 0.04$). Only large amounts of perioperative fluid administration and meperidine use had statistically significant effects on micturition problems.
Conclusions: Urinary retention is a rare complication after elective cholecystectomy. Helping measures are very effective and should be tried before inserting a urethral catheter.

Keywords: Urinary retention; Micturition difficulty; Cholecystectomy; Laparoscopy; Postoperative complication

Urinary retention is a minor complication seen in the postoperative period. Its incidence after general surgical procedures has been reported ranging from 2% to 32% [1–8]. Although most of the high figures have been obtained in the series of lower abdominal operations [3,4], postoperative urinary retention (PUR) can develop after every type of procedures including cholecystectomy [5,9–13]. The only specific study on the incidence of PUR after cholecystectomy was carried out by Petros et al [5]. In this retrospective series, 30% of the patients developed PUR after elective cholecystectomy. This rate was quite high in comparison with the other retrospective cholecystectomy series reported by Davies and Cranston [14] (8%), and Demirel et al [15] (5%) as the control groups of their urological studies.

Laparoscopic surgery has become the procedure of choice for elective cholecystectomy, even in pregnancy [16]. To date, many studies have been performed to assess complications of this technique. Some of those studies have mentioned urinary retention [12,13] and urinary infection [17] among general complications of the technique; however, no specific study has been planned to determine the rate of urinary retention after laparoscopic cholecystectomy. Therefore, we planned a prospective study to determine the PUR rate after cholecystectomy and to investigate the differences between open and laparoscopic techniques.

Methods

One hundred and forty patients who were operated on for chronic cholelithiasis in our department in a 1-year period were included in this prospective study. All but one surgeon preferred laparoscopic cholecystectomy as the routine procedure. Indication for operation was similar for two procedures. One hundred and seven patients were operated on laparoscopically, and the remaining 33 patients were operated on by the open approach. Open cholecystectomy was done via subcostal incision, which was closed with continuous suturing. The intraabdominal pressure was kept not higher than 15 mm Hg during the laparoscopic cholecystectomy. The criteria for exclusion were previous catheterization history, chronic renal disorders, urinary tract ob-

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struction, pericholecystic abscess, emphysema of the gallbladder, concomitant common bile duct exploration, additional intraabdominal interventions, drugs affecting micturition mechanism, and malignancy. Five cases in which the surgeon converted the laparoscopic procedure to laparotomy owing to difficulty in dissection were also excluded.

We defined postoperative urinary retention as the inability to pass urine for a longer time than 12 hours after induction of anesthesia, when the patient had discomfort and the bladder was palpated in the suprapubic region [3–7, 18,19]. The problem was recorded as postoperative difficulty in micturition (PDM) if the patient was eventually able to void after helping measures, such as helping the patients stand up or walk, providing privacy and a quiet environment, applying a warm water bottle to the suprapubic area, or use of spasmolytic agents [1,7,19,20].

All the patients were asked to empty the bladder just before transport to the operating room. General anesthesia with halothane was used in all cases. Anesthetists and surgical residents in charge of the cases were not informed about the study. Patient-controlled analgesia was not used for any patient. Concomitant medical problems in the patient history, the agents used for premedication, the duration of the operation, total CO_2 volume used during the laparoscopic procedure, total intravenous fluid volume infused in the perioperative period (intraoperative plus postoperative), and nonopiate or opiate analgesics given after the operation and their total dosages were strictly recorded in each file.

The chi-square test and Student *t* test were used for statistical analysis. A *P* value of <0.05 was accepted as significant. In SPSS for Windows statistical program, a multivariate analysis (stepwise logistic regression) was performed to determine independent variables related to urinary retention.

Results

One hundred and twenty-one female and 19 male patients aged 23 to 67 years (mean 51) were included in the study. The laparoscopic cholecystectomy group (LG; n = 103) and the open cholecystectomy group (OG; n = 33) had similar characteristics. In all, 10 patients out of 140 were not able to pass urine spontaneously. Nine of those could eventually void with helping measures before 12 hours postoperatively. Only 1 patient who was operated on laparoscopically needed urethral catheter insertion. This patient did not need second catheterization after the first short-time application. Overall PUR rate was 0.7%, and there were no differences between laparoscopic and open techniques ($P = 0.06$). On the other hand, the PDM rate was 7.1%, and there was a significant difference between LC and OC groups: 4.7% versus 15.2% ($P = 0.04$; Table 1).

Among the variables recorded in the study protocol, only perioperative intravenous fluid volume and meperidine had significant effects on PDM. The mean perioperative total intravenous fluid volume was 2,020 mL for the patients with PDM and 1,401 mL for the patients with no postoperative urinary problems. The difference was significant ($P = 0.03$). Postoperative meperidine use was also a factor for developing PDM. It developed in 8 (11.4%) of 70 patients who were given 50 to 100 mg meperidine but in only 2 (2.8%) of 70 patients who did not received meperidine for postoperative analgesia ($P = 0.03$). When OG and LG were compared in respect to the mean perioperative fluid volume (1,874 mL versus 1,314 mL, $P = 0.004$) and the rate of the patients who needed 50 to 100 mg meperidine postoperatively (72.7% versus 41.1%, $P = 0.001$), these figures were found to be significantly lower in LG.

Table 1
Postoperative micturition difficulty and urinary retention rates

Procedure	Number of patients	Postoperative micturition difficulty* (%)	Urinary retention requires catheterization† (%)
Laparoscopic cholecystectomy	107	5 (4.7%)	1 (0.9%)
Open cholecystectomy	33	5 (15.2%)	—
Total	140	10 (7.1%)	1 (0.7%)

* $P = 0.04$.
† $P = 0.06$.

In univariate analysis, neither gender nor age affected PDM rate. Among 121 female patients—who were the majority of the cases in the present study—PDM developed in 9 (7.4%). On the other hand, only 1 (5.3%) of 19 male patients had this problem ($P = 0.73$). The mean age of the 10 PDM cases was found to be 53.6 years. The other 130 patients with no urinary difficulties had a mean age of 50 years ($P = 0.45$). Similarly, the mean operating time of the patients with PDM was 78.5 minutes, and that of the patients without PDM was 70.4 minutes ($P = 0.39$). In addition, concomitant cardiopulmonary problems in the patient history, diabetes mellitus, and the agents used for premedication were not related to the postoperative urinary problems (Table 2).

Multivariate analysis also showed that perioperative intravenous fluid volume and postoperative meperidine use were independent variables for postoperative urinary retention. The other factors, including age, gender, concomitant cardiopulmonary diseases, diabetes mellitus, diazepam premedication, atropine premedication, operative technique (laparoscopic versus open), duration of the operation, and total CO_2 volume used during the laparoscopic procedure, could not enter the regression equation.

Comments

Although urinary retention is a minor postoperative complication, it can lead to catheterization, subsequent urinary

Table 2
Factors that had no effects on postoperative micturition

Factor	Number of patients	Postoperative micturition difficulty (%)	*P* value*
Concomitant cardiopulmonary disease			
Yes	41	9.8	
No	99	6.1	0.44
Diabetes mellitus			
Yes	6	—	
No	134	7.5	0.49
Diazepam premedication			
Yes	86	7.0	
No	54	7.4	0.92
Atropine premedication			
Yes	86	9.3	
No	54	3.7	0.21

* Chi-square test (Pearson).

tract infections, and even urethral stricture formation [1,8, 20,22,23]. The etiology of PUR involves combinations of many factors. Some drugs such as parasympatholytics increase bladder capacity, decrease the rate of bladder contractions, and cause urethral resistance, while anesthetic agents decrease the intravesical pressure and inhibit the micturition reflex [20]. Analgesics, especially opioids, can also cause PUR particularly after epidural administration [6,7,18,20].

Among general surgical operations, PUR is frequently seen after inguinal herniorhaphy and anorectal procedures [3,4]. The reason for high PUR rates after these operations is partly the choice of epidural anesthesia with long acting agents [4]; but the problem primarily originates from the dissection at the common area of innervation of the urethral sphincter [3]. Contrary to those procedures, elective cholecystectomy via a subcostal incision does not seem to create a specific reason for PUR. However, Petros et al [5] reported a 30% PUR rate after elective cholecystectomy in 1992. On the other hand, Shea et al [12] reported a 17.9% PUR rate in the prelaparoscopic era. They showed a sharp decline to 6.5% after the introduction of laparoscopic cholecystectomy. The same study group also reported a 1.4% PUR rate in a meta-analysis of different laparoscopic series [13]. In our prospective study, similar to Shea's results, the overall PUR rate after elective cholecystectomy was less than 1% and the rate of total postoperative difficulties in micturition was found to be significantly higher in the open group than in the laparoscopy group.

The first aim of this study was to determine our own rate of postoperative difficulties in micturition. Both PUR and PDM rates were found to be low in the present study, as we had expected. However, it must be remembered that the patients with previous urinary retention history or current urinary tract problems were left out of the study. The second question was whether there would be a difference between PDM rates for OG and LG patients, and why. The well-documented advantages of laparoscopic techniques are less pain, early mobilization, less analgesic need, and smaller intravenous fluid volume [24–26]. The LG patients in the present study also had these advantages. On the other hand, a possible disadvantage of laparoscopic cholecystectomy might be high intraabdominal pressure due to CO_2 insufflation during the procedure. The only study in the English literature on the effect of abdominal pressure on urinary flow rate has shown that the proximal 2 cm of the urethra in both men and women is intraabdominal [27], and it has been reported in another study that urinary bladder pressure is equal to intraabdominal pressure [28]. However, no relationship has yet been documented between high abdominal pressure and the development of urinary retention.

In contrast to some previous studies [1,4,8,18], we found that age and male sex were not important variables for PUR as some other authors have stated [3,7]. In addition, concomitant cardiopulmonary disease, diabetes mellitus, preoperative atropine and diazepam medication, operative technique (laparoscopic versus open), operating time, and total CO_2 volume had no effects either in univariate analysis or in multivariate analysis. Only perioperative intravenous fluid volume and meperidine use were found to be independent factors for PDM. In several previous studies large amounts of intravenous fluid were responsible for PUR after general surgical procedures, and it was possible to prevent retention with fluid restriction [1,3,29]. In the study by Petros et al on elective cholecystectomy, the patients with retention received a mean of 1,971 mL intravenous fluid, whereas the patients without retention were infused with a mean intravenous fluid volume of 1,851 mL. The *P* value was near significance, but this difference disappeared by logistic regression analysis [5]. We did not do any fluid restriction in our cases. The difference between mean fluid volumes of the patients with and without PDM in our study was statistically significant in univariate analysis and was an independent prognostic indicator in multivariate analysis.

The administration of large amounts of fluids causes urinary retention probably by producing overdistension of the wall of the bladder. Because the bladder is composed of smooth muscle, its contractility increases to a peak level as it fills with urine and then declines. Therefore, an overdistended bladder cannot empty itself because its wall cannot generate sufficient contractile force [3].

Narcotic analgesics have long been accused of causing postoperative urinary retention [1,6,7,18]. They relax the detrussor muscle and increase the tonus of the urethral sphincter [1,20]. Petros et al [5] reported that the patients received larger total dosages of narcotic analgesics (morphine or meperidine) after cholecystectomy were significantly more likely to have retention. Both in that study and in another study done by the same author on open appendectomy, patient-controlled analgesia resulted in the use of large dosages of analgesic agents, and eventually resulted in PUR [6]. Although we did not use patient-controlled analgesia, patients who received intramuscular meperidine for

postoperative analgesia had a higher PDM rate than the patients who did not receive this agent.

It has been shown in previous studies that simple measures were effective to help patients who had initial difficulties in passing urine. In addition, of these measures, early mobilization, privacy, and use of a warm water bottle are completely cost free. In case these measures are insufficient, spasmolytic agents can be tried to intervene in the micturition difficulty. Stallard and Prescott [7] reported that simple measures were successful in helping 57% of the patients with PDM. In the series by Gönüllü et al [1], 26 of 111 patients got benefit from helping measures. Kulaçoğlu et al [2] also stated that only 1 of 5 patients could not pass urine in spite of helping measures. A similar result was obtained in the present study: 9 of 10 patients who had initial difficulties of micturition managed to void with simple, helpful measures.

In conclusion, we obtained two findings in the present study. One, neither urinary retention nor micturition difficulty is a frequent problem after elective cholecystectomy, either laparoscopic or open. And two, measures to help patients void are highly effective, therefore, they should be tried first; short-term catheterization should be saved as a last resort.

References

[1] Gönüllü NN, Gönüllü M, Utkan NZ, et al. Postoperative retention of urine in general surgical patients. Eur J Surg 1993;159:145–7.

[2] Kulaçoğlu IH, Meriç L, Çetinkurşsun S, Ertuna C. The incidence of urinary retention after epidural anesthesia. Clin Exp Surg 1995;3: 170–4.

[3] Petros JG, Bradley TM. Factors influencing postoperative urinary retention in patients undergoing surgery for benign anorectal disease. Am J Surg 1990;159:374–6.

[4] Petros JG, Rimm EB, Robilard RJ, Argy O. Factors influencing urinary tract retention in patients undergoing elective inguinal herniorrhaphy. Am J Surg 1991;161:431–4.

[5] Petros JG, Rimm EB, Robillard RJ. Factors influencing urinary tract retention after elective cholecystectomy. Surg Gynecol Obstet 1992; 174:497–500.

[6] Petros JG, Alameddine F, Testa E, et al. Patient-controlled analgesia and postoperative urinary retention after hysterectomy for benign disease. J Am Coll Surg 1994;179:663–7.

[7] Stallard S, Prescott S. Postoperative urinary retention in general surgical patients. Br J Surg 1988;75:1141–3.

[8] Tammela T, Kontturi M, Lukkarinen O. Postoperative urinary retention. I: incidence and predisposing factors. Scand J Urol Nephrol. 1986;20:197–201.

[9] Adams DB, Tarnasky PR, Hawes RH, et al. Outcome after laparoscopic cholecystectomy for chronic acalculous cholecystitis. Am Surg 1998;64:1–5.

[10] Firilas A, Duke BE, Max MH. Laparoscopic cholecystectomy in the elderly. Surg Endosc 1996;10:33–5.

[11] Kumar N, Annudath KB, Shukla HS, et al. Postoperative intravenous drip infusion is not required after minilaparotomy cholecystectomy. Hepato Pancreat Bil Surg 1997;10:279–81.

[12] Shea JA, Berlin JE, Bachwich DR, et al. Indications for and outcomes of cholecystectomy: a comparison of the pre and postlaparoscopic eras. Ann Surg 1998;227:343–50.

[13] Shea JA, Healey MJ, Berlin JE, et al. Mortality and complications associated with laparoscopic cholecystectomy: a meta-analysis. Ann Surg 1996;224:609–20.

[14] Davies AH, Cranston D. Urinary retention after pyeloplasty. B J Urol 1991;67:456–8.

[15] Demirel A, Polat Ö, Siyez E, et al. Urinary retention after renal and ureteric surgery. Br J Urol 1993;72:54–5.

[16] Barone JE, Bears S, Chen S, et al. Outcome study of cholecystectomy during pregnancy. Am J Surg 1999;177:232–6.

[17] Eldar S, Eitan A, Bickel A, et al. The impact of patient delay and physician delay on the outcome of laparoscopic cholecystectomy for acute cholecystitis. Am J Surg 1999;178:303–7.

[18] Petros JG, Mallen JK, Howe K, et al. Patient-controlled analgesia and postoperative urinary retention after open appendectomy. Surg Gynecol Obstet 1993;177:172–5.

[19] Singer AJ, Barlett JD, Abbe RR, et al. Postoperative urinary retention: guidelines and an algorithm. Postgrad Med 1987;81:154–6.

[20] Pertek JP, Haberer JP. Effects of anesthesia on postoperative micturition and urinary retention. Ann Fr Anesth Reanim 1995;14:340–51.

[21] Stricker K, Steiner W. Postoperative urinary retention. Anaesthesist 1991;40:287–90.

[22] Sethia KK, Selkon JB, Berry AR, et al. Prospective randomized controlled trial of urethral versus suprapubic catheterization. Br J Surg 1987;74:624–5.

[23] Rosser CJ, Bare RL, Meredith JW. Urinary tract infections in the critically ill patient with a urinary catheter. Am J Surg 1999;177:287–90.

[24] Berggren U, Gordh T, Grama D, et al. Laparoscopic versus open cholecystectomy: hospitalization, sick leave, analgesia and trauma response. Br J Surg 1994;81:1362–5.

[25] Kum CK, Wong CW, Goh PM, et al. Comparative study of pain level and analgesic requirement after laparoscopic and open cholecystectomy. Surg Laparosc Endosc 1994;4:139–41.

[26] Soper NJ, Berteau JA, Clayman RV, et al. Comparison of early postoperative results for laparoscopic versus standard open cholecystectomy. Surg Gynecol Obstet 1992;174:114–18.

[27] Hasegawa N, Kitagawa Y, Taksaki N, et al. The effect of abdominal pressure on urinary flow rate. J Urol 1983;130:107–11.

[28] Yol S, Kartal A, Tavli S, et al. Is urinary bladder pressure a sensitive indicator of intraabdominal pressure? Endoscopy 1998;30:778–80.

[29] Bailey HR, Ferguson JA. Prevention of urinary retention by fluid restriction following anorectal operations. Dis Colon Rectum 1976; 19:250–2.