Does Morbid Obesity Adversely Affect Success and Complication Rates in Percutaneous Nephrolithotomy?

Morbid Obezite Perkütan Nefrolitotomide Başarı ve Komplikasyon Oranlarını Etkiler mi?

Cemal Selçuk İşoğlu[1], Tufan Süelözgen[1], Hakan Türk[2], Mehmet Yoldaş[2], Mustafa Karabıçak[1], Batuhan Ergani[1], Okan Nabi Yalbuzdağ[1], Hayal Boyacıoğlu[3], Yusuf Özlem İlbey[1], Ferruh Zorlu[1]

[1]Tepecik Training and Research Hospital, Clinic of Urology, İzmir, Turkey
[2]Evliya Çelebi Training and Research Hospital, Clinic of Urology, Kütahya, Turkey
[3]Ege University Faculty of Science, Division of Statistics, İzmir, Turkey

---

What's known on the subject? and What does the study add?

Efficacy of percutaneous nephrolithotomy in morbid obese patients is still debatable. We believe that this study may give valuable information about this topic.

ABSTRACT

Objective

To investigate percutaneous nephrolithotomy (PNL) results of morbid obese patients with a body mass index (BMI) of ≥40 kg/m² by comparing with a control group of normal BMI (20-25 kg/m²).

Materials and Methods

Thirty patients with a BMI of ≥40 kg/m² were randomly assigned to group 1 and 30 patients with a normal BMI (20-25 kg/m²) constituted group 2 as controls. We compared the groups with regard to baseline characteristics, intraoperative parameters, and stone-free and complication rates.

Results

A total of 60 patients were included in the study. Demographic data and stone burden were similar in both groups. We found no significant differences in access number and success, operative time, and stone-free and complication rates.

Conclusion

PNL is a safe and effective treatment even for patients with a BMI of ≥40 kg/m².

Keywords

Kidney, kidney calculi, percutaneous nephrolithotomy, morbid obesity

ÖZ

Amaç

Vücut kitle indeksi (VKİ) 40 kg/m² üzerinde olan hastaların perkütan nefrolitotomi (PNL) sonuçlarını VKİ normal sınırlarda olan (20-25 kg/m²) hastalardan oluşmuş kontrol grubu ile kıyaslamak amaçlandı.

Gereç ve Yöntem

VKİ 40 kg/m² üzerinde olan 30 hasta grup 1 olarak adlandırıldı. İstatistiksel olarak uygun kıyaslama yapabilmek için VKİ normal sınırda olan hastalar arasından random olarak 30 hasta seçildi ve grup 2 olarak adlandırıldı. Gruplar temel demografik veriler, intaoperatif parametreler, taşsızlık ve komplikasyon oranları açısından kıyaslandı.

Bulgular

Toplam 60 hasta çalışmaya dahil edildi. Demografik veriler ve taş yükü iki grup arasında benzerdi. Gruplar arasında akses sayısı, akses başarısı, operasyon zamanı gibi preoperatif data, taşsızlık ve komplikasyon oranları açısından anlamlı fark saptanmadı.

Sonuç

PNL morbid obez hastalarda bile güvenli ve etkili bir yöntemdir.

Anahtar Kelimeler

Böbrek, böbrek taşı, perkütan nefrolitotomi, morbid obezite

J Urol Surg
2016; 3: 80-83

İşoğlu et al.
Results of Percutaneous Nephrolithotomy in Morbid Obese Patients

Introduction

Kidney stone formation is a common disease and its lifetime prevalence varies between 1% and 15%. With considerably high stone-free rates and acceptable complication rates, percutaneous nephrolithotomy (PNL) is accepted as the gold standard treatment method for kidney stones larger than 2 cm, according to the European Association of Urology and American Urological Association guidelines (1).

On the other side, today, obesity is also a common heath problem worldwide. Its incidence is increasing day by day due to inappropriate dietary patterns and decreased physical activities (2). Outcomes of PNL which is frequently performed in stone surgery today are controversial for obese patients There have been some studies reporting that obesity adversely affects the results while some others showed no effect (3,4). We investigated outcomes of PNL in morbid obese patients [body mass index (BMI) ≥40 kg/m2] using the data of our clinic by comparing with a control group.

Materials and Methods

The data of 1150 patients who underwent PNL between the years 2008 and 2015 in our clinic were retrospectively analysed. We evaluated 958 patients whose demographical, perioperative and postoperative data were completely accessible and met the inclusion criteria. Patients under 18 years of age and those having urinary system anomaly or a history of ipsilateral open stone surgery or PNL were excluded. A total of 60 patients were included. The patients were divided into two groups: 30 patients with a BMI ≥40 kg/m2 were included in group 1 and 30 patients with a normal BMI (20-25 kg/m2), who served as controls, constituted group 2.

Demographic characteristics, such as age, gender, height, and weight of the included patients were accessed. Preoperative imaging of all patients was implemented by non-contrast computed tomography (NCCT) of the abdomen. On imaging, only calyx or only pelvic stones were called as simple stones; whereas the stones occupying one or more calyces in addition to the pelvis as well as staghorn stones were named as complex stones.

The period from contrast material administration to the placement of nephrostomy catheter was recorded as operation time. In addition, how many seconds the fluoroscopic imaging was used throughout the operation, how many accesses were made and the presence of peroperative complications, if any, were recorded.

At the end of the operation, a 14 Fr re-entry Malecot catheter was placed in all patients. Malecot catheter was removed on the 1st-3rd day postoperatively and the patients without any complications were discharged. Postoperative complications and additional interventions, if any, were also recorded separately. All the patients were reassessed by NCCT which is routinely taken at postoperative 1st month. Observing stones of 4 mm or smaller size or no stones were accepted as operational success.

Statistical Analysis

The chi-square test was used to examine the differences with categorical variables and the Mann-Whitney U test to compare the differences between two independent groups. In the analysis "α", p≤0.05 was taken into account. We used simple random sampling method in this paper. Simple random sampling is the basic sampling technique where we select a group of subjects (a sample) for a study from a larger group (a population). Each individual is chosen entirely by chance and each member of the population has an equal chance of being included in the sample. Every possible sample of a given size has the same chance of selection. Excel was used to generate a random sample with n=30, without replacement in this study. IBM SPSS (Statistical Package for the Social Sciences) software SPSS Inc (version 15.00) was used for statistical analysis.

Results

A total of 60 patients were included in the study. Of the patients in group 1, 13 (43%) were male, 17 (57%) were female and 10 (33%) of the patients in group two were male, 20 (67%) were female. There was no difference between the groups in terms of gender (p=0.426).

The average age of the patients was 44.7±2.36 years in group 1 and 46±3.30 years in group 2. There was no significant difference between the groups in terms of age (p=0.871).

Twenty-four patients had simple stones and 6 patients had complex stones in both group 1 and group 2. Therefore, two groups were identical in regard to stone burden (p=1).

The average operation time was 64.5±8.03 minutes in non-obese group, while it was 56±7.8 minutes in morbid obese group. We did not determine any significant difference between the two groups with respect to operation time (p=0.148).

The average fluoroscopy time was 149±35.2 seconds in group 1 and 162±36.8 seconds in group 2. There was no significant difference in fluoroscopy time between the groups (p=0.673).

Single access was performed in 27 patients and double access was done in three patients in group 1. In group 2, however, single access was performed in all the patients. There were no patients with no access. There was no difference in the number of access between the groups (p=0.237) (Table 1). There were no postoperative complications in either groups. Two patients (6.6%) in morbid obese group and three patients (10%) in group 2 required blood transfusion due to postoperative hemodynamic instability. There was no difference in postoperative bleeding between the groups (p=1). Postoperative fever

Table 1. Patient demographics and intraoperative variables			
	Group 1 (n=30)	Group 2 (n=30)	p value
Average age (year)	44±2.36	46±3.30	0.871
Gender (%) Male Female	13 (43) 17 (57)	10 (33) 20 (67)	0.426
Stone burden (%) Simple Complex	24 (80) 6 (20)	24 (80) 6 (20)	1
Number of access Single Double	27 3	30 -	0.237
Operation time (min)	56±7.8	64.5±8.03	0.148
Fluoroscopy time (sec)	149±35.2	162±36.8	0.673

İşoğlu et al.
Results of Percutaneous Nephrolithotomy in Morbid Obese Patients

J Urol Surg
2016; 3: 80-83

Table 2. Postoperative outcomes and complications			
	Group 1 (n=30)	Group 2 (n=30)	p value
Stone-free rates (%)	3 (10)	8 (26.6)	0.181
Postoperative transfusion (%)	2 (6.6)	3 (10)	1
Postoperative fever (%)	2 (6.6)	5 (16.6)	0.424
Additional intervention (%) DJS	1 (3.3)	-	1
DJS: Double-J stent			

exceeding 38 °C was observed in two patients in morbid obese group and in five patients in non-obese group. Those patients with high fever were discharged after appropriate monitoring and treatment. There was no significant difference in fever between the groups (p=0.424). Sepsis developed in none of the patients, no patients required intensive care and no patients were lost due to operation-related complications.

When the groups were analysed in regard to operational success, we observed postoperative residual stones in three patients (10%) in group one and in eight patients (26.6%) in group 2. There was no significant difference between the groups in terms of operational success (p=0.181).

The groups were also evaluated with respect to additional postoperative interventions. In the non-obese group, double-J stent was inserted in one patient due to fluid discharge coming out of incision site. No patients required additional intervention in the morbid obese group. The two groups were identical with respect to any requirement for additional intervention (p=1) (Table 2).

Discussion

Today, obesity is increasing worldwide. The rate of increase in the last three decades is even higher, particularly in high-income countries (5). Obesity has multiple roles in the formation of kidney stones.

Obese patients have a rather more inactive life in comparison to non-obese patients. Furthermore, higher prevalence of gout disease in obese patients, as well as high amount of purine, carbohydrates and animal fat content in their diet have adverse effects on stone formation. Impaired ammonia metabolism as the result of insulin resistance as well as transport problems in renal tubular cells pave the way for renal stone formation (6).

Obesity, while increasing the susceptibility to urolithiasis, creates complications in treatment. Extracorporeal shock wave lithotripsy poses a problem for these patients due to the increased f2 distance. Success rate is low in patients with high stone burden (7). Recently, retrograde intrarenal surgery appears to be a good treatment alternative due to low complication rates. However, considering low stone-free rate in single sessions, longer operational time as well as necessitating additional intervention, it is arguable that this is a good alternative to PNL for high stone burden patients (8,10).

Anesthesia can be problematic in obese patients. With the additional adverse contribution of prone position, respiratory troubles are encountered at a higher rate in obese patients due to the decrease in total lung capacity, expiratory lung volume and functional residual capacity as well as the problems related to mechanical endotracheal intubation (11). For this reason, PNL operation was performed in some centers in supine position instead of prone position, and it was shown that operation time was shorter while stone-free, complication, blood transfusion and postoperative fever rates were similar (12,13). In our clinic, PNL was performed in prone position since we had no experience of PNL in supine position. There was no anesthesia-related complication in any of the patients.

In their study of 530 patients, Faerber and Goh (14) determined that the complication rate in 93 obese patients was considerably higher than in patients having normal BMI. Besides that, Paerle et al. (15) reported that blood transfusion was required more in the obese group. In our study, there was no difference in transfusion requirement between the groups (p=1). When the groups were compared for other complications, there were also no differences between the groups in terms of postoperative fever and any need for additional intervention after PNL (p=0.424, p=1).

Koo et al. (3) determined no difference between groups with respect to operative duration and hemorrhage in their series of 181 patients divided into 4 groups according to the World Health Organization classification of BMI. In our study, we observed no difference in operative duration between the morbid obese and normal weight groups (p=0.148). At the same time, no difference was found in fluoroscopy requirement between the groups (p=0.673).

In their study including 546 obese patients, El-Assmy et al. (16) found a success rate of 84.8% in obese patients. They found no difference vin success rates between the patients that they studied in 4 groups. In our study, the success rate in morbid obese group was around 90% and no statistically significant difference was determined between the groups (p=0.181)

The Clinical Research Office of the Endourological Sovciety study group published the first prospective study including 3.709 patients (17). PNL-operated patients were sorted with respect to their BMI. Contrary to many publications, they expressed that as BMI increased, stone-free rate decreased and operation time increased. In our study, the success rate in morbid obese patients was similar to that in normal BMI group.

Conclusion

Even though this was a retrospective study, we determined that morbid obesity had no effect on operational complications in PNL and operational success. Further studies are required with higher number of patients in order to have a definite conclusion on this matter.

Ethics

Ethics Committee Approval: Ethics committee approval was not obtained because this was a retrospective study, Informed Consent: Written informed consent can not be obtained from patients because this was a retrospective study.

Peer-review: Internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Tufan Süelözgen, Cemal Selcuk İşoğlu, Concept: Cemal Selcuk İşoğlu, Yusuf Özlem İlbey, Design: Tufan Süelözgen, Ferruh Zorlu, Data Collection or Processing: Hakan

J Urol Surg
2016; 3: 80-83

İşoğlu et al.
Results of Percutaneous Nephrolithotomy in Morbid Obese Patients

Türk, Mehmet Yoldaş, Batuhan Ergani, Mustafa Karabıçak, Analysis or Interpretation: Cemal Selçuk İşoğlu, Hayal Boyacıoğlu, Literature Search: Okan Nabi Yalbuzdağ, Yusuf Özlem İlbey, Writing: Cemal Selçuk İşoğlu, Tufan Süelözgen.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

References

1. C. Türk (Chair), T. Knoll (Vice-chair), A. Petrik, K. Sarica, A. Skolarikos, M. Straub, C. Seitz. Guidelines on Urolithiasis. European Association of Urology 2015. p.16-24.

2. Calvert RC, Burgess NA. Urolithiasis and obesity: metabolic and technical considerations. Curr Opin Urol 2005;15:113-117.

3. Koo BC, Burtt G, Burgess NA. Percutaneous stone surgery in the obese: outcome stratified according to body mass index. BJU Int 2004;93:1296-1299.

4. Alyami FA, Skinner TA, Norman RW. Impact of body mass index on clinical outcomes associated with percutaneous nephrolithotomy. Can Urol Assoc J 2012;15:1-5.

5. Finucane MM, Stevens GA, Cowan MJ. National, regional and global trends in body-mass index since 1980: systematic analysis of health examinations surveys and epidemiological studies with 960 country -years and 9.1 million participants. Lancet 2011;377:557-567.

6. Asplin JR. Obesity and urolithiasis. Adv Chronic Kidney Dis 2009;16:11-20.

7. Mezentsev VA. Extracorporeal shock wave lithotripsy in the treatment of renal pelvicalyceal stones in morbidly obese patients. Int Braz J Urol 2005;31:105-110.

8. Dragutescu M, Multescu R, Geavlete B. Impact of obesity on retrograde ureteroscopic approach. J Med Life 2012;5:222-225.

9. Wheat JC, Roberts WW, Wolf JS Jr. Multi-session retrograde endoscopic lithotripsy of large renal calculi in obese patients. Can J Urol 2009;16:4915-4920.

10. Breda A, Ogunyemi O, Leppert JT. Flexible ureteroscopi and laser lithotripsy for multiple unilateral intrarenal stones. Eur Urol 2009;55:1190-1196.

11. Juvin P, Lavaut E, Dupont H. Difficult tracheal intubation is more common in obese than in lean patients. Anesthesia and Analgesia 2003;97:595-600.

12. Liu L, Zheng S, Xu Y. Systematic review and meta-analysis of percutaneous nephrolithotomy for patients in the supine versus prone position. J Endourol 2010;24:1941-1946.

13. Mazzucchi E, Vicentini FC, Marchini GS. Percutaneous nephrolithotomy in obese patients: comparison between the prone and total supine positions. J Endourol 2012;26:1437-1442.

14. Faerber GJ, Goh M. Percutaneous nephrolithotripsy in the morbidly obese patient. Tech Urol 1997;3:89-95.

15. Paerle MS, Nakada SY, Womack JS. Outcomes of contemporary percutaneous nephrostolithotomy in morbidly obese patients. J Urol 1998;160:669-673.

16. El-Assmy AM, Shokeir AA, El-Nahas AR. Outcome of percutaneous nephrolithotomy: effect of body mass index. Eur Urol 2007;52:199-204.

17. Fuller A, Razvi H, Denstedt JD. The CROES percutaneous nephrolithotomy global study: the influence of body mass index on outcome. J Urol 2012;188:138-144.