

Evaluation of Modified Makuuchi Incision in Terms of Postoperative Pain, Incisional Hernia, and Cosmetics: Observational Study

Postoperatif Ağrı, İnsizyonel Herni ve Kozmetik Açından Modifiye Makuuchi İnsizyonunun Değerlendirilmesi: Gözlemsel Çalışma

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ABSTRACT Objective: The modified Makuuchi incision (MMI) consists of a midline incision from the xiphoid to just above the umbilicus, and a transverse incision to the 12th rib. It is J-shaped on the right and L-shaped on the left side. We aimed to evaluate the postoperative pain, incisional hernia, and cosmetic satisfaction of patients who underwent renal surgery with this technique. **Material and Methods:** Between January 1, 2015 and March 31, 2021, patients who performed simple, partial, and radical nephrectomy with MMI in our clinic were determined, and whose surgery was performed at least 3 months ago and had contact information in hospital records were called by phone. They were questioned in terms of incisional pain, incisional bulging or hernia, and cosmetic appearance. **Results:** A total of 152 patients with kidney surgery were identified. Ninety-seven were operated via MMI, and 57 of them were interviewed. Thirty-seven were male and 20 were female. The mean age was 55.3 years (21-86 years) and the mean postoperative follow-up period was 28 months (3-75 months). There was no patient with ongoing pain and was still in need of analgesics. Forty-five patients (78.9%) stated that they were satisfied with the cosmetic appearance. One patient (1.7%) reported incisional bulging and 1 (1.7%) reported a hernia. **Conclusion:** In cases with large renal tumors or a history of previous abdominal surgery, MMI did not cause permanent and serious problems in terms of pain, cosmetic, and herniation. We think that it is useful to know this incision for urologists who are interted in complicated renal surgeries.

ÖZET Amaç: Modifiye makuuchi insizyonu (MMI) ksifoid altından umblikusun hemen üzerine kadar linea alba üzerinde bir orta hat kesisi ve bu kesinin alt noktasından 12. kostaya uzanan transvers kesiden oluşur. Sağ taraf için J, sol taraf için L şeklindedir. Bu teknikle renal cerrahi yapılan hastaların postoperatif ağrı, insizyonel herni ve kozmetik açıdan memnuniyetlerini değerlendirmeyi amaçladık. **Gereç ve Yöntemler:** 1 Ocak 2015 ve 31 Mart 2021 tarihleri arasında kliniğimizde MMI ile basit, parsiyel ve radikal nefrektomi uygulanan hastalar hastane kayıtlarından belirlendi. İletişim bilgisine ulaşılabilen ve ameliyattan sonra en az 3 ay zaman geçen hastalar telefonla arandı ve yara yerindeki ağrı hakkında memnuniyetleri, yara yerinde şişlik ya da fıtık gelişip gelişmediği ve insizyona dair kozmetik açıdan memnuniyet durumları sorularak cevapları kaydedildi. **Bulgular:** Böbrek cerrahisi yapılan 152 hasta tespit edildi. Doksan yedi hastada MMI kullanılmıştı ve bunların 57'siyle telefonda görüşüldü. Hastaların 37'si erkek, 20'si kadındı. Yaş ortalaması 55,3 yıl (21-86 yıl) ve postoperatif takip süresi ortalaması 28 aydı (3-75 ay). Takipte yara yerinde ağrısı devam ettiği için analjezik ihtiyacı olan hastaya rastlanmadı. Kırk beş hasta (%78,9) yara yeri iyileştikten sonraki kozmetik görünümünden memnun olduğunu belirtti. Bir hasta insizyon yerinde şişlik (%1,7), 1 hasta (%1,7) herni bildirdi. **Sonuç:** MMI, büyük renal kitlelerde ve geçirilmiş batın operasyonu öyküsü olan vakalarda tercih edilebilmektedir. Çalışmamızda MMI'nın postoperatif dönemde analjezik kullanımı gerektirecek ağrıya yol açmadığını, kozmetik ve insizyon herniasyonu açısından da ciddi sorun oluşturmadığını gördük. Bu nedenle komplelike böbrek ameliyatları ile ilgilenen ürologlar için bu insizyonu bilmenin faydalı olduğunu düşünüyoruz.

Keywords: Renal surgery; Makuuchi; pain; hernia; satisfaction

Anahtar Kelimeler: Böbrek cerrahisi; Makuuchi; ağrı; herni; memnuniyet

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In recent years, minimally invasive techniques have gained importance in renal surgery. Nevertheless, open surgery is chosen by some surgeons, or it is a necessity in patients with previous abdominal surgery history or large kidney masses. Subcostal, chevron, flank, midline, or thoracoabdominal incisions can be used in open renal surgery. However, there is no evidence that one is better than the other. It is important to have adequate exposure to the surgical area in order to minimize blood loss and have easy access to the renal vessels and hilum. Selecting the incision is affected by the location and size of the tumor, and the surgeon's experience and choice.¹

The Makuuchi incision was first described by Masatoshi Makuuchi for hepatic resection in a 1993 report coauthored with Kawasaki.¹ It consists of a midline incision from the xiphoid process to 5 cm above the umbilicus, and it then curves laterally along with the ninth intercostal space and ends at the posterior axillary line. Later, this was modified for foregut surgery by Chang et al. in 2008.² The midline incision was extended to just above the umbilicus, and the lateral one to the tip of the 12th rib. Modified Makuuchi incision (MMI) is J-shaped for the right side and L-shaped for the left (Figure 1). It is widely used in foregut and hepatobiliary surgeries. As well, its use in adrenal and renal surgery is increasing.^{3,4}

This study aimed to evaluate the postoperative pain, incisional hernia, and cosmetic satisfaction of patients who underwent renal surgery with this technique.

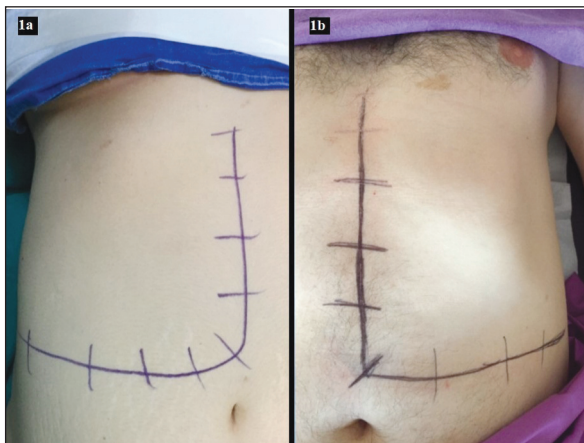


FIGURE 1: A J-shaped incision for the right side (1a) and an L-shaped incision for the left side (1b).¹

MATERIAL AND METHODS

The patients who underwent simple, partial, and radical nephrectomy in our clinic between January 1, 2015 and March 31, 2021 were determined from the electronic patient record (EPR) system of the hospital. Operated with flank, subcostal, chevron, and midline incision or laparoscopic and robotic methods were excluded from the study, and cases that used MMI were defined. Patients whose surgery was performed at least 3 months ago and who had contact information at the EPR system were called by phone. They were questioned whether they had ongoing pain at the incision site and currently needed analgesics, if there were any signs of swelling or hernia at the incision area, and if they were satisfied with their cosmetic appearance following recovery.

Ethical approval for this study was obtained from Gazi University Ethics Committee (date: April 19, 2022, permission of ethics document's number: E-77082166-604.01.02-344157) and the study was made in compliance with the Helsinki Declaration principles. Informed consent was obtained from all patients for inclusion in the study.

RESULTS

A total of 152 patients with kidney surgery were identified. Twenty of them were exitus and 35 were operated with other incisions and approaches. Ninety-seven patients who used MMI remained, and 57 of them were interviewed by phone as their contact information was available. Thirty-seven of the patients were male and 20 were female. The mean age was 55.3 years (21-86 years) and the mean postoperative follow-up period was 28 months (3-75 months).

There was no patient with ongoing pain at the wound site and was still in need of analgesics during the postoperative period. Forty-five patients (78.9%) stated that they were satisfied with the cosmetic appearance after the wound healed. One patient (1.7%) reported incisional bulging and one patient (1.7%) reported incisional hernia.

DISCUSSION

The traditionally used incisions are sufficient for exposure and access to the hilum in most renal and

adrenal surgeries. However, for large kidney tumors or surgeries in need of the manipulation of other organs such as the liver, pancreas, and spleen, other approaches may be required.³

There have been some advantages described in the literature for MMI. In their study of 144 cases, Pandit et al. showed that the MMI provided many operative ergonomics and less postoperative pain according to thoracoabdominal and inverted T incision.⁵ The midline incision of this approach spares muscles through the linea alba, and the lateral one is quite far away from the costal margin, causing limited nerve injury through a single dermatome. It is believed that these are the principles to reduce post-operative skeletal muscle laxity, pain, and dysesthesia.⁴

During the recovery period after renal surgery, durable pain may occur in the wound area, requiring analgesics. In the study that included 142 patients who underwent open partial nephrectomy via flank incision, persistent pain was found in 27 (19%) patients. Three of them stated that they needed stronger analgesics than paracetamol or non-steroidal anti-inflammatory drugs.⁶ In another study, ongoing chronic pain was found in 17 (24%) of 70 patients who underwent radical nephrectomy with a flank incision. Two (2%) of them reported analgesic treatment requiring.⁷ In our study, early postoperative analgesia need was the same as in the other surgical approaches, and there was no patient in need of analgesics because of the pain persistence on the wound site at follow-up.

Although there is a large amount of data on wound complications due to different incision types in the literature, data about MMI are limited. A non-systematic review of the literature revealed a hernia rate of 9% to 22% for midline incisions, 16% for subcostal, and 18% for chevron.⁴ Inkiläinen et al. asked 142 patients with a flank incision about the presence of abdominal wall asymmetry (AWA), including bulgings and hernias. 42 patients (30%) stated that they developed postoperative permanent AWA.⁶ In a retrospective evaluation of 5,216 patients operated via flank incision due to renal cell carcinoma, obtained from the Sweden Renal Cell Cancer Database, the hernia rate at 5 years was found to be 5.2%.⁸ On the other hand, in a review that includes 630 patients, the flank region hernias were 15% of them.⁹

As the surgeries using MMI increase, we learn more about its wound site complications. Chang et al. reported that the rate of incisional hernia after MMI was 10.9%.² It was reported 4.2% by Pandit et al. and 12% by Ruffolo et al.^{4,5} In the study by Togo et al., hernia frequencies after median and J-shaped incisions were 6.3% and 4.7%, respectively.¹⁰

In our study, according to the patients' own statements, there was a bulging in one patient and a hernia in one patient at the surgery site. The bulging and hernia rate was 3.6% in our group. This rate is comparable with other studies.

In addition to the functional and oncological results of urological surgeries, studies on quality of life and patient satisfaction are increasing over time. In this context, Inkiläinen et al. showed that AWA is a common complication after flank incision and most patients with this entity consider it to have a negative impact on cosmetic appearance.⁶ Evaluations of cosmetic outcomes after MMI are generally relevant to the studies about satisfaction in reverse L incision, which is used commonly in liver transplantation. In research about different methods for donor hepatectomy, an upper midline and a transverse incision with laparoscopy had more cosmetic satisfaction than reverse L.¹¹ In another study, body image was affected in 24% of donors, and they found themselves less attractive because of scar formation.¹² These studies were done on donors, but our patients mostly had cancer surgery. The cosmetic satisfaction rate reported by the patients was 78.9%, and this is not a low result. This may be because they see oncological results as more important than cosmetics, and may be related to the average age of 55.3. Younger patients may be less satisfied with the cosmetic results of MMI.

There are some limitations in this study. The present study is not a comparative study. Bulging or hernia which the patients reported was not confirmed with diagnostic imaging results. Also, literature data on cosmetic satisfaction is based on objective questionnaires and scales on satisfaction and quality of life, while ours is based on patients' self-report.

We generally used MMI in tumor surgery, but this can also be used in other challenging surgeries

such as pyonephrosis in which perfect exposure is required. We can't claim that this is the only and best incision in renal surgery. Our purpose is to introduce it to urology professionals for complicated kidney surgery procedures.¹

CONCLUSION

In large renal tumor surgeries and cases with a previous abdominal surgery history, MMI did not cause any permanent or serious problems in terms of pain, cosmetics, or incision herniation. We think that it is useful to know this incision for urologists who are interested in complicated renal surgeries.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct con-

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Ali Atan; **Design:** Ali Atan; **Control/Supervision:** Fazlı Polat, Süleyman Yeşil, Ali Ünsal; **Data Collection and/or Processing:** Ahmet Olgun; **Analysis and/or Interpretation:** Fazlı Polat, Süleyman Yeşil, Ali Ünsal; **Literature Review:** Ahmet Olgun; **Writing the Article:** Ahmet Olgun, Ali Atan; **Critical Review:** Fazlı Polat, Süleyman Yeşil.

REFERENCES

- Polat F, Atan A, Yeşil S, Dikmen K, Ünsal A. Modified Makuuchi incision in the surgical treatment of renal tumors: Initial results. *Turk J Urol.* 2019;45(6):467-70. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
- Chang SB, Palavecino M, Wray CJ, Kishi Y, Pisters PW, Vauthey JN. Modified Makuuchi incision for foregut procedures. *Arch Surg.* 2010;145(3):281-4. [[Crossref](#)] [[PubMed](#)]
- Bokka SH, Sreenivasan Kodakkattil S, Manikandan R, Lalgudi Narayanan D, M H, Kalra S, et al. Usage of modified makuuchi incision for surgical management of complex renal and adrenal lesions. *Cureus.* 2020;12(10):e11012. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
- Ruffolo LI, Nessen MF, Probst CP, Jackson KM, Ruan DT, Schoeniger LO, et al. Open adrenalectomy through a makuuchi incision: A single institution's experience. *Surgery.* 2018;164(6):1372-6. [[Crossref](#)] [[PubMed](#)]
- Pandit N, Awale L, Adhikary S, Banerjee JK, Ghosh S, Kulkarni S, et al. Modified Makuuchi incision for major upper abdominal surgeries. *Pol Przegl Chir.* 2019;91(6):15-9. [[Crossref](#)] [[PubMed](#)]
- Inkiläinen A, Blomqvist L, Ljungberg B, Strigård K. Patient-reported outcome measures of abdominal wall morbidity after flank incision for open partial nephrectomy. *BJU Int.* 2021;128(4):497-503. [[Crossref](#)] [[PubMed](#)]
- Chatterjee S, Nam R, Fleshner N, Klotz L. Permanent flank bulge is a consequence of flank incision for radical nephrectomy in one half of patients. *Urol Oncol.* 2004;22(1):36-9. [[Crossref](#)] [[PubMed](#)]
- Hermann M, Gustafsson O, Sundqvist P, Sandblom G. Rate of incisional hernia after minimally invasive and open surgery for renal cell carcinoma: a nationwide population-based study. *Scand J Urol.* 2021;55(5):372-6. [[Crossref](#)] [[PubMed](#)]
- Zhou DJ, Carlson MA. Incidence, etiology, management, and outcomes of flank hernia: review of published data. *Hernia.* 2018;22(2):353-61. [[Crossref](#)] [[PubMed](#)]
- Togo S, Nagano Y, Masumoto C, Takakura H, Matsuo K, Takeda K, et al. Outcome of and risk factors for incisional hernia after partial hepatectomy. *J Gastrointest Surg.* 2008;12(6):1115-20. [[Crossref](#)] [[PubMed](#)]
- Suh SW, Lee KW, Lee JM, Choi Y, Yi NJ, Suh KS. Clinical outcomes of and patient satisfaction with different incision methods for donor hepatectomy in living donor liver transplantation. *Liver Transpl.* 2015;21(1):72-8. [[Crossref](#)] [[PubMed](#)]
- Darwish Murad S, Fidler JL, Poterucha JJ, Sanchez W, Jowsey SG, Nagorney D, et al. Longterm clinical and radiological follow-up of living liver donors. *Liver Transpl.* 2016;22(7):934-42. [[Crossref](#)] [[PubMed](#)]