Iatrogenic Diaphragm Injury Repaired with Mesh Suture

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INTRODUCTION

- Iatrogenic diaphragm injury can occur during <1% of nephrectomies and they are classically repaired with permanent suture and +/- mesh use.[1-3]
- Mesh suture was approved by the FDA in 2022, designed as a mid-weight polypropylene network of suture.[4-5]
- Here we demonstrate the use of mesh suture for an iatrogenic diaphragm defect during a nephrectomy.

CASE REPORT

- Patient is a 63 year old female presenting with a xanthogranulomatous pyelonephritis secondary to a large left staghorn calculus resulting in retroperitoneal abscess which was adherent to the left diaphragm (Figure 1).
- Past medical history: polysubstance abuse, hepatitis C, COPD
- Past surgical history: none

OPERATIVE CASE

- Combination case with urology, colorectal, and general surgery.
- Elective exploratory laparotomy was performed.
- Descending colon dissected off left kidney by colorectal surgery.
- Urology mobilized kidney off psoas and posterior diaphragm, resulting in posterior diaphragm defect.
- General surgery called into the operating room for 10cm defect in left diaphragm which was subsequently closed with mesh suture in a running fashion.
- Urology closed the midline with mesh suture in a running fashion.
- Post-operative CT showed no recurrence (Figure 2).



Figure 1. CT scan showing staghorn calculus, atrophic kidney, and abscess.



Figure 2. Post-operative CT scan after resection showing intact diaphragm.

DISCUSSION

- There is some new literature on the use of mesh suture in ventral, incisional, parastomal hernias.[6]
- This case presents an interesting and innovative use for mesh suture for repair of an iatrogenic diaphragm defect.
- There is a lack of literature on the use of mesh suture as an alternative to permanent suture for diaphragm repair.
- This may indicate a different method of repair of diaphragm injuries, diaphragm hernias, cruroplasty, etc.

CONCLUSION

Here we demonstrate the use of mesh suture for repair of an iatrogenic diaphragm defect. Mesh suture is a technology that may be further incorporated into diaphragm and hiatus repair.

REFERENCES

1. de Meijer VE, Vles WJ, Kats E, den Hoed PT. Iatrogenic diaphragmatic hernia complicating nephrectomy: top-down or bottom-up? Hernia. 2008;12(6):655-658. doi:10.1007/s10029-008-0377-x
2. Gonzalez CM, Batler RA, Feldman M, Rubenstein JN, Nadler RB, Schoor RA. Repair of a diaphragmatic injury during hand assisted laparoscopic nephrectomy using an onlay patch of polypropylene and polyglactin mesh. J Urol. 2002;167(6):2512-2513.
3. Diaphragmatic repair and/or reconstruction during upper abdominal urological laparoscopy - PubMed. Accessed March 2, 2025. https://pubmed.ncbi.nlm.nih.gov/17937950/
4. Duramesh registry study: short-term outcomes using mesh suture for abdominal wall closure - PubMed. Accessed May 31, 2024. https://pubmed.ncbi.nlm.nih.gov/38274351/
5. Yurtkap Y, den Hartog FPJ, van Weteringen W, Jeekel J, Kleinrensink GJ, Lange JF. Evaluation of a new suture material (DurameshTM) by measuring suture tension in small and large bites techniques for laparotomy closure in a porcine model. Hernia. 2020;24(6):1317-1324. doi:10.1007/s10029-020-02140-7
6. Quattrone M, Moyer ED, Zolin SJ, et al. Short-term outcomes of mesh-suture repair in the treatment of ventral hernias: a single-center study. Surg Endosc. 2025;39(3):2129-2135. doi:10.1007/s00464-025-11524-8