Recurrent Torsion of Otherwise Normal Adnexa: Oophoropexy Does Not Prevent Recurrence

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Research Article

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Abstract

Purpose

Recurrence of adnexal torsion involving otherwise normal adnexa is not rare. Various oophoropexy (ovarian fixation) procedures have been suggested to prevent recurrence, however, long-term information of their efficacy is lacking. The aim of this study was to investigate the recurrence rate of adnexal torsion following oophoropexy.

Methods

Retrospective cohort study, including all consecutive patients who underwent an oophoropexy procedure for the prevention of recurrent torsion of “normal adnexa” in our department from 2008 to 2021. Oophoropexy techniques included shortening of the utero-ovarian ligament (between 2008 to 2019) or combined utero-ovarian and round ligament fixation (from 2020).

Results

Twenty-one patients (age range 7-35 years) with a mean follow-up of 82.7 ± 60.6 months were identified. Fifteen of them (71.4%) were re-operated for recurrent torsion following an oophoropexy procedure, while six (28.6%) did not experience recurrence. Twelve (57.1%) torsion recurrences following an oophoropexy occurred within the first 2 postoperative years. There were no differences in mean age and menarchal status)pre- or post-menarchal) at the time of the first torsion event, age at the time of oophoropexy, oophoropexy side, number of adnexal torsion events before oophoropexy, and follow-up duration between those with and those without post-oophoropexy recurrences.

Conclusion

Oophoropexy procedures may not prevent recurrent torsion of otherwise normal adnexa. Further studies to determine whether combined fixation (utero-ovarian plication and round ligament) is more efficacious than isolated utero-ovarian plication for the prevention of recurrent torsion are warranted.

Introduction

Adnexal torsion is a gynecologic emergency occurring in pre-menarchal girls, teens, and women of reproductive age, necessitating prompt surgical treatment, usually by laparoscopy [1]. The pathophysiology of adnexal torsion is unknown. However, cases of adnexal torsion may be classified into two distinct groups: torsion involving ovarian or paratubal cysts (torsion of “pathologic” adnexa), and torsion of otherwise “normal adnexa”. In the former group, the surgical treatment includes adnexal untwisting and cystectomy, and the risk of recurrent torsion is very low [2, 3]. In the latter group, the

surgical management includes only untwisting of the adnexa, and the reported risk of torsion recurrence is high, reaching 40%-60% [3, 4]. Furthermore, torsion recurrence in women with a history of torsion of otherwise normal adnexa may involve the contralateral adnexa, possibly leading to devastating fertility sequelae [5].

Various adnexal fixation (oophoropexy) procedures have been proposed with the aim of reducing the risk for recurrent torsion of otherwise normal adnexa [6, 7]. These procedures include plication and shortening of the utero-ovarian ligament (Figure 1), and fixation of the ovary to the round ligament. A novel oophoropexy procedure combining the plication of the utero-ovarian ligament and fixation to the round ligament has recently been described (Figure 2) [8]. Descriptions of all oophoropexy procedures have been limited to retrospective case reports and small case series with varying follow-up periods [6–9], and recent case reports have suggested that recurrent torsion following oophoropexy is not uncommon [8, 9].

The aim of the current study is to investigate the rates of recurrent torsion following oophoropexy for preventing torsion of otherwise normal adnexa in a long-term retrospective study on 21 women.

Patients And Methods

Study Design

All consecutive women who underwent surgical oophoropexy between 1/2008 and 10/2021 in the Obstetrics and Gynecology Department of Shamir (Assaf Harofe) Medical Center, Zerifin, Israel were identified through a retrospective search of our computerized database. Their medical records were reviewed for demographic information, medical and surgical history, operative reports, and follow-up clinical and emergency department visits.

The oophoropexy procedures were offered to patients with recurrent torsion of otherwise normal adnexa, either at the time of an urgent laparoscopy for de-torsion or as an elective procedure. Only the ipsilateral adnexa (i.e., the adnexa diagnosed with recurrent torsion) was fixed in the initial oophoropexy surgery.

Procedures

The oophoropexy procedures included shortening and plication of the ipsilateral utero-ovarian ligament (between 1/2008 to 12/2019) (Figure 1), and combined plication of the utero-ovarian ligament and fixation to the round ligament (from 1/2020 to the present) (Figure 2). Briefly, the plication of the utero-ovarian ligament was performed by passing a running suture from the ovary to the uterus through the ligament and tying it either intra- or extra-corporeally, bringing the ovary adjacent to the uterus. The combined fixation included the plication of the utero-ovarian ligament followed by the application of 3-4 interrupted sutures starting from the round ligament and extending to the utero-ovarian ligament, taking care to ensure that the fallopian tube was untouched. All fixations were performed with non-absorbable 2-0 Ethibond or 2-0 Prolene sutures (Ethicon, Johnson & Johnson, NJ, USA). All of the procedures were

performed laparoscopically, with the exception of one patient who had a concomitant laparotomic myomectomy.

Patients who underwent oophoropexy procedures were scheduled for yearly clinic visits. Women whose information on a follow-up visit within the last year was not available in the medical records were contacted by telephone to enquire about torsion recurrence.

Statistics

The statistical analysis was performed with the SPSS software (version 26, IBM Corp.). Descriptive variables are presented as mean ± standard deviation or as median (range). Frequencies were compared with the Chi-square test or with the Fisher's exact test. Means and medians were compared with the Student t-test or with the ANOVA test as appropriate. The survival analysis was performed with the Kaplan-Meier procedure. A *P*-value < .05 was considered statistically significant.

Ethics

The study was approved by the institutional Review Board (#0332-19-ASF, approved on September 2nd, 2020) which waived informed consent for this retrospective review of medical records. Oral informed consent was obtained from all patients who were contacted by telephone for the acquisition of follow-up information.

Results

In total, 21 patients underwent oophoropexy procedures during the study period (Figure 3), and 15 of them (71.4%) were re-operated for recurrent torsion, while the remaining 6 (28.6%) did not sustain a recurrence. Fourteen of those 15 women (93.3%) underwent a second oophoropexy procedure, and one patient opted for a unilateral salpingo-oophorectomy. Torsion recurred following the second oophoropexy in four of those 14 (28.6%) cases: it was managed by a third oophoropexy in two cases and by a unilateral salpingo-oophorectomy in the other two cases (Figure 3). The mean follow-up period for the entire study cohort (calculated from their first oophoropexy to their clinic or telephone follow-up) was 82.7 ± 60.6 months. The demographic and surgical characteristics of the study cohort at the time of the first oophoropexy procedure are shown in Table 1.

The demographic and surgical characteristics were compared between patients with recurrent torsion following oophoropexy (N=15), and the patients without recurrence (N=6) (Table 2). No statistically significant differences were found in patients' age and menarchal status (pre- or post-menarchal) at the time of the first torsion event, age at the time of the oophoropexy, laterality of the oophoropexy, number of adnexal torsion events before the oophoropexy, and follow-up duration. The oophoropexy performed in all of the patients in the recurrence group was plication of the utero-ovarian ligaments. In the non-recurrence group, utero-ovarian ligament plication was performed in 4 of the 6 women (66.7%), while the remaining two (33.3%) underwent a combined utero-ovarian and round ligament fixation Similarly, although the

mean follow-up period for the recurrence group was longer than that for the non-recurrence group, that difference also did not reach a level of significance.

The survival analysis indicating the time from oophoropexy to recurrence is shown in Figure 4. Recurrent torsion was noted to have occurred within the first 2 years after oophoropexy in 12 (57.1%) cases.

Two patients in our cohort had presented with bilateral asynchronous torsion. The first patient was diagnosed with left adnexal torsion causing complete adnexal necrosis at the age of 13 years. She was subsequently operated for three episodes of right adnexal torsion for which three separate oophoropexy procedures were performed, after which there have not been any additional recurrences to date. The second patient was operated for right adnexal torsion at the age of 16 years. She underwent re-torsion of the right ovary 2 years later, and sustained two episodes of left ovarian torsion over the next 2 years. No further torsion events occurred following two oophoropexy procedures of both ovaries.

Discussion

Oophoropexy procedures appear to have limited efficacy in the prevention of recurrent torsion events in women diagnosed with torsion of otherwise normal adnexa, with recurrences having occurred in ¬70% of our cases. This finding is in accordance with previous anecdotal case reports which described recurrent torsion following fixation [8, 9]. Three retrospective case series described a post-oophoropexy recurrence rate in the range of 10–17% [2, 6, 10]. However, the follow-up time in those reports was either unspecified, short (~2 years), or incomplete, and the indications for oophoropexy were broad, including torsion of “pathologic” adnexa whose recurrence risk is very low [2].

The etiology of torsion and recurrent torsion involving otherwise normal adnexa is unknown. It has been hypothesized that elongated adnexal ligaments (the utero-ovarian ligaments in particular) may predispose to this condition. However, the utero-ovarian ligaments may also become elongated secondary to the repeated twisting of the adnexa at the time of torsion, making it difficult to differentiate between the cause and the effect of elongated ligaments.

The common practice of ovarian fixation for the prevention of torsion is to shorten the adnexal ligaments and/or anchor the ovary to an adjacent pelvic structure, such as the round ligaments, the uterus, the pelvic sidewalls, or the utero-sacral ligaments. Due to the rarity of this condition, the different fixation techniques have not been compared to date and the optimal procedure has not yet been determined. Following the high rate of failure with the utero-ovarian plication procedure in our patients, we now perform the combined utero-ovarian and round ligament fixation. The combined technique has the advantage of additional anchoring of the adnexa. However, this procedure is more technically difficult to execute and may cause occlusion of the fallopian tube in the process. Our study was too underpowered to compare the success rates of the different fixation techniques, and further studies are necessary.

Our practice has been to offer oophoropexy to patients who have experienced at least two torsion episodes. This practice may have contributed to the high failure rate of oophoropexy in our current study.

If recurrent torsion events do cause further elongation of the adnexal ligaments, performing the oophoropexy after one episode of torsion may increase its success rate. Nevertheless, it is important to bear in mind that oophoropexy is often not technically feasible at the time of the first torsion episode because the massive adnexal enlargement and edema preclude effective suturing. As such, the optimal timing of oophoropexy remains a matter of controversy.

In the current study, the follow-up period for the non-recurrence group was shorter than for the recurrence group, albeit without reaching statistical significance. Thus, the recurrence rate may have been underestimated in our study, and longer follow-up may have revealed additional recurrences.

In the view of the failure of surgical techniques to prevent recurrent torsion, non-surgical strategies should be considered. These strategies include the prescription of hormonal contraceptives, with the view that small functional cysts may increase the risk for torsion. However, that approach has not been studied to date. Additionally, fertility preservation with oocyte or ovarian tissue cryopreservation may be considered in patients with high-order recurrences necessitating multiple surgeries. Such an approach should allow for unilateral salpingo-oophorectomy without fertility compromise.

Our study is limited by its relatively small cohort and its retrospective design. However, given the rarity of this condition, larger cohorts would only be feasible in a multi-center or population study.

Conclusion

Oophoropexy procedures appear to have limited effect upon the prevention of recurrent torsion of otherwise normal adnexa. The optimal surgical technique for oophotopexy has not yet been established, and non-surgical strategies, such as fertility preservation, may be considered in patients with high-order torsion recurrence.

Declarations

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Ethics approval and informed consent: The study was approved by the institutional Review Board (#0332-19-ASF, approved on September 2nd, 2020) which waived informed consent for this retrospective review of medical records. Oral informed consent was obtained from all patients who were contacted by telephone for the acquisition of follow-up information.

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Author Contributions: All authors contributed to the study conception and design.

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Data collection was performed by: Noam Smorgick and Matan Mor.

Data analysis was performed by: Noam Smorgick and Zvi Vaknin.

The first draft of the manuscript was written by: Noam Smorgick.

All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Tables

TABLE 1 Demographic and surgical characteristics of the study cohort.

Variable	
Age at time of first torsion event (years)	18.9 ± 8.7
Menarchal status at time of first torsion event	
Pre-menarchal	6 (28.6)
Post-menarchal	15 (71.4)
Age at time of first oophoropexy procedure (years)	20.6 ± 8.5
Type of first oophoropexy procedure	
Utero-ovarian ligament plication	19 (90.5)
Combined utero-ovarian and round ligament plication	2 (9.5)
Number of torsion events before first oophoropexy procedure	2 (1-3)
Side of first oophoropexy	
Right	14 (66.7)
Left	7 (33.3)

Data are shown as mean ± standard deviation, mean (range) or percentage (%).

TABLE 2 Comparison of patients with and without recurrent torsion following the first oohoropexy procedure.

Characteristic	Recurrent torsion after oophoropexy (N=15)	No recurrence (N=6)	*P* value
Age at time of first torsion event (years)	18.8 ± 8.4	19.3 ± 10.3	0.9
Menarchal status at time of first torsion event			
Pre-menarchal	4 (26.7)	2(33.3)	0.7
Post-menarchal	11(73.3)	4(66.7)	
Age at time of first oophoropexy procedure (years)	20.5 ± 8.1	20.8 ± 10.4	0.8
Type of first oophoropexy procedure			
Utero-ovarian ligament plication	15 (100.0)	4 (66.7)	0.07
Combined utero-ovarian and round ligament plication	0	2 (33.3)	
Number of torsion events before first oophoropexy procedure	2 (1-3)	2 (2-3)	0.5
Side of first oophoropexy			
Right	10 (66.7)	4 (66.7)	1.0
Left	5 (33.3)	2 (33.3)	
Follow-up duration (months)	92.8 ± 58.7	57.3 ± 60.4	0.3

Data are provided as mean ± standard deviation, mean (range) or number (%).

Figures

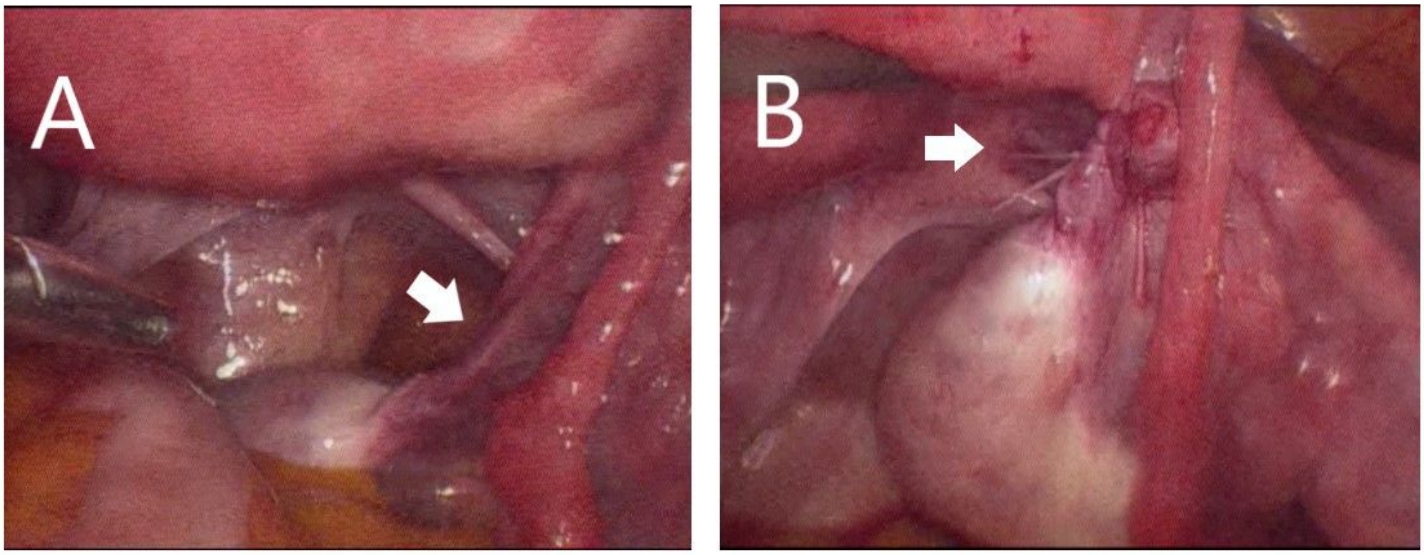

Figure 1

Utero-ovarian ligament plication. (**A**) An elongated right utero-ovarian ligament is observed before the plication (arrow). (**B**) The ovary is adjacent to the uterus and the ligament is shorter (arrow) following the plication.

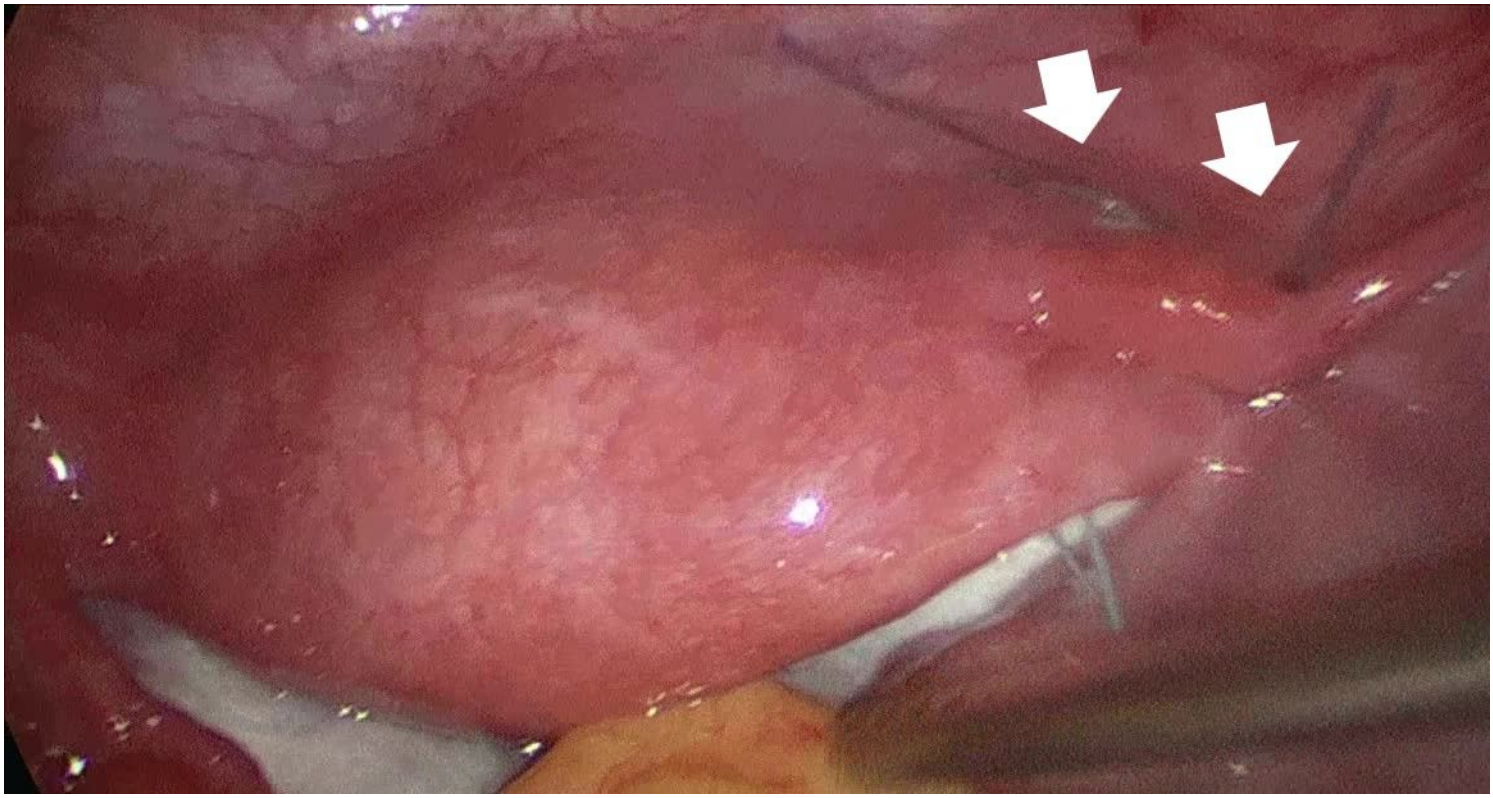

Figure 2

Combined utero-ovarian plication and fixation to the round ligament. Interrupted sutures (arrows) are placed from the round ligament to the utero-ovarian ligament while sparing the fallopian tube.

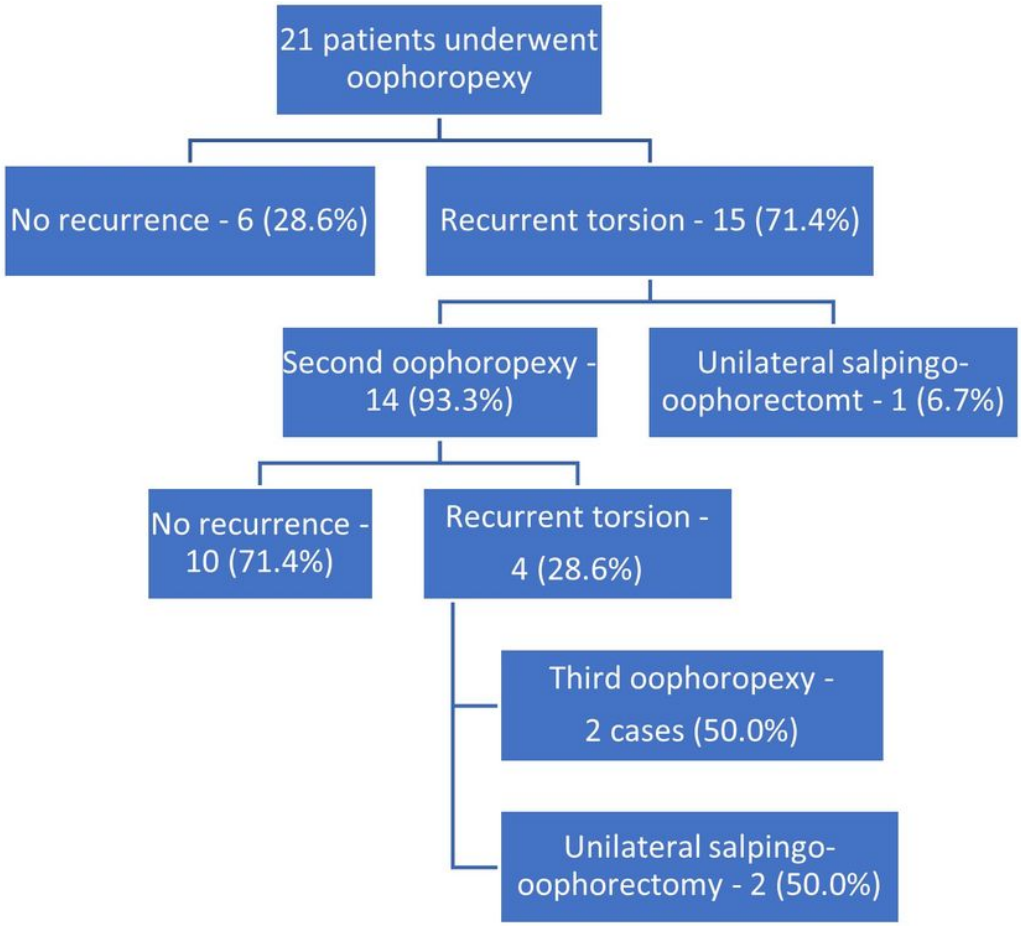

Figure 3

Flowchart of the study cohort.

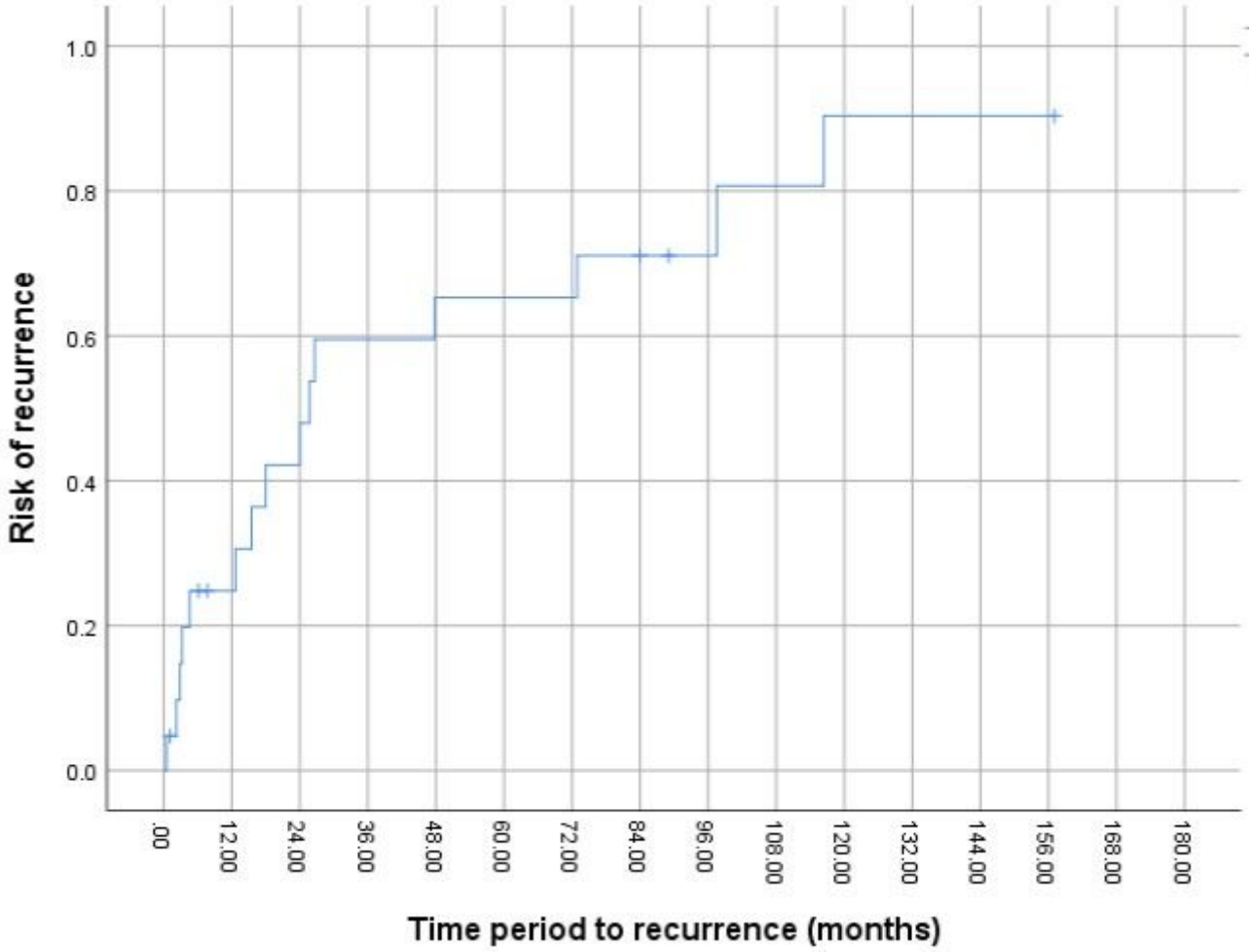

Figure 4

Survival analysis (Kaplan-Meier plot) showing the risk for torsion recurrence over time following oophoropexy.