



Double-layered anterior colporrhaphy (DAC)—video and mid-term follow-up of 60 patients

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Abstract

Introduction and hypothesis Anterior colporrhaphy (AC) exhibits high recurrence rates, and this issue is not appropriately addressed by alloplastic material, which often necessitates reoperation. Aiming to improve the anatomical cure rate, we implemented double-layered anterior colporrhaphy (DAC). With a retrospective investigation, precise description and video of the surgical technique, we want to contribute to the development of native tissue anterior repair.

Methods Women treated by DAC and vaginal hysterectomy were included. Primary outcome was anatomic cure defined as prolapse < stage 2. Secondary outcomes were complication rate, resolution of postvoid residual urine, reoperation for prolapse and patient satisfaction. Follow-up encompassed a clinical gynecologic examination, the German Pelvic Floor Questionnaire and a response scale for postoperative quality of life (QoL). The key difference between DAC and AC is the continuous suture followed by the traditional interrupted sutures.

Results One hundred one patients were eligible, and 60 patients attended follow-up. Cure was achieved in 49 cases (81.7%) of cystocele with a median follow-up of 19.3 months. Fifty-five patients (91.7%) indicated an improvement in QoL.

Conclusions We observed high anatomic cure rate and satisfaction after DAC. With description and video of the technique, it is reproducible and comparable to other methods. Randomized controlled trials should follow.

Keywords Cystocele repair · Native tissue repair · Pelvic organ prolapse · Standardized surgical technique

Introduction

In most cases, anterior colporrhaphy (AC) exhibits high recurrence rates. While use of alloplastic material lowers recurrence rates, it is also accompanied by complications such as mesh erosion and de novo dyspareunia, frequently requiring reoperation [1]. Therefore, alloplastic material is not recommended for the primary surgical approach.

Consequently, we need to develop surgical techniques that yield long-lasting results without relying on alloplastic material. In the process, a particular focus should be placed on standardization of operation technique and reporting.

Halpern-Elenskaia et al. [2] emphasized this challenge when they reported on 40 randomized controlled trials (RCT) and found no detailed description of AC and differences in each step of the procedure. Fairclough et al. [3] came to similar conclusions when they analyzed the native tissue anterior repair techniques of 30 surgeons in the UK.

Some authors recommend, depending on the severity of the prolapse, two rows of traditional horizontal plication or a purse-string suture preceding the traditional plication [4, 5]. However, these expert opinions have not been supported by scientific studies. Aiming to improve the anatomical outcome, we developed double-layered anterior colporrhaphy (DAC) in which a continuous suture is followed by traditional sutures. Wound surface and risk of hematoma are thought to be reduced subsequently.

We carried out a study on patients who underwent DAC and vaginal hysterectomy. In the video we demonstrate the different steps of DAC. Furthermore, we precisely describe the operation techniques, perioperative care and procedures. With this work we want to contribute to the development and standardization of native tissue anterior repair.

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Patients and methods

The retrospective study included women treated by DAC with vaginal hysterectomy and apical fixation between January 2018 and August 2019. The institutional ethics committee gave approval, and registration followed in the German Clinical Trials Register (<https://apps.who.int/trialsearch/>) with trial-ID DRKS00021807.

Inclusion criteria were > 12 months after operation for \geq stage 3 cystocele and \geq stage 2 uterine (or cervical) prolapse (according to the Pelvic Organ Prolapse Quantification system [6]). Exclusion criteria were any other concurrent or previous pelvic floor or urinary incontinence surgery.

Primary outcome was anatomic cure defined as prolapse < stage 2. Secondary outcomes were complication rate, resolution of postvoid residual urine (PVR), reoperation for symptomatic recurrence and patient satisfaction.

Follow-up included a clinical gynecologic examination, introital sonography, catheterization for quantification of PVR, assessment of subjective results using the German Pelvic Floor Questionnaire [7] and a response scale (Likert) for postoperative quality of life (QoL).

Surgical technique and perioperative procedures

DAC and vaginal hysterectomy (and cervix extirpation) with apical fixation are standardized procedures in our clinic. We will omit the description of vaginal hysterectomy here as it was previously published by our group [8, 9]. Following hysterectomy, DAC is performed while the epithelium of the vaginal vault is still open. Before incision, 10 ml of Xylonest® 0.5% with adrenaline (prilocaine 5 mg/ml and epinephrine 4 μ g/ml) divided into four doses is infiltrated paravaginally. The vaginal wall is tunneled and opened in the midline from the vaginal vault up to the urethrovesical junction using scissors. The pubocervical fascia is separated from the vaginal wall, first using scissors and then by blunt preparation up to the lateral sulci (arcus tendineus fasciae pelvis). Importantly, the fascia does remain on the bladder. The key difference between DAC and AC is the following unlocked continuous suture [Ethicon® coated Vicryl™ (polyglactin 910), braided absorbable suture 0]. It starts at the level of the urethrovesical junction and incorporates on each side half of the fascia to close the midline defect.

Afterwards, the traditional AC procedure is performed. Starting with a suture (Coated Vicryl™, 0) at the vesicouterine ligaments, the fascia is taken as laterally as

possible and plicated by interrupted horizontally oriented sutures with a distance of 0.5–1.0 cm between sutures. The vaginal epithelium is subtly trimmed until the tunica muscularis becomes visible (to include this layer into the suture) and as far as the vaginal width allows. The colpotomy is closed without tension with a locked continuous suture [Ethicon® Monocryl™ (poliglecaprone 25), monofilament absorbable suture 3-0]; the epithelium of the vaginal vault is closed with 2–4 interrupted sutures (Coated Vicryl™, 0).

Operation is performed under general anesthesia. A single dose of cefazolin 2 g iv is administered 10 min preoperatively. Postoperatively, a transurethral Foley catheter and a vaginal pack with estriol gel are placed for 24 h. Intermittent catheterization is used in case of > 150 ml PVR (bladder scanner).

Results

One hundred one patients were eligible for the study. Sixty patients attended follow-up with a median time of 19.3 months. Anatomical cure was achieved in 49 cases (81.7%) of cystocele (point Aa, Ba) and in 59 cases (98.3%) of vaginal vault prolapse (point C). Main outcomes are listed in Table 1. Reasons for not participating were concerns due to the COVID-19 pandemic ($n = 12$), refusal ($n = 8$), distance to the hospital ($n = 7$) and other diseases ($n = 7$). In addition, several patients could not be contacted ($n = 7$).

One operation was cervix extirpation after laparoscopic-assisted supracervical hysterectomy (LASH) 10 years before, and in 12 cases additional procedures (adnexectomy, salpingectomy, adhesiolysis, open supraumbilical hernia repair) were performed.

There were no cases of ureteral, bladder or bowel injury during operation. One patient with solitary kidney, renal insufficiency and anticoagulation therapy (paused for operation) was reoperated the same day for a retroperitoneal hematoma (originating from the hysterectomy wound) and therefore beginning hydronephrosis. The hematoma was removed by abdominal-pararectal incision; no sutures had to be opened. There were no sequelae.

Preoperatively, 26 (43.3%) patients had PVR \geq 80 ml (sonographically). After DAC, five patients showed PVR \geq 80 ml at follow-up (minimum 100 ml, maximum 225 ml, catheterization) (Table 1). Each had PVR before surgery, one patient only 50 ml. Including the latter, resolution of PVR was achieved in 81.4% of patients.

No patient was reoperated for prolapse. One patient with preoperative mixed urinary incontinence received transurethral bulking agent (Bulkamid®, Axonics®), indicated at follow-up.

Table 1 Descriptive analysis of the study cohort

Parameter	Category	DAC <i>n</i> (%) / med (IQR)
Operation		60 (100%)
Age at operation (years)		66 (58–71)
Body mass index at operation		25.1 (22.5–27.5)
Parity		2 (1–2)
Preoperative Aa, Ba (POP-Q)	Stage 3	55 (91.7%)
	Stage 4	5 (8.3%)
Preoperative C (POP-Q)	Stage 2	26 (43.3%)
	Stage 3	31 (51.7%)
	Stage 4	3 (5%)
Preoperative PVR \geq 80 ml	No	34 (56.7%)
	Yes	26 (43.3%)
Time for surgery (min)		55 (45–65)
Subvesical hematoma 2 days postoperative	No	51 (85%)
	Yes	9 (15%)
Time to follow-up (months)		19.3 (16.1–25.5)
Postoperative Aa, Ba (POP-Q)	Stage 0	7 (11.7%)
	Stage 1	42 (70%)
	Stage 2	11 (18.3%)
Cure rate	Stage 0–1	49 (81.7%)
Recurrent cystocele	Stage 2	11 (18.3%)
Postoperative C (POP-Q)	Stage 0	55 (91.7%)
	Stage 1	4 (6.7%)
	Stage 3	1 (1.7%)
Postoperative tvl (cm)		8 (7.5–9)
Postoperative PVR \geq 80 ml	No	55 (91.7%)
	Yes	5 (8.3%)
Postoperative German Pelvic Floor Questionnaire, prolapse domain		
Foreign body sensation	Never	52 (86.7%)
	Occasionally	6 (10%)
	Frequently	1 (1.7%)
	Daily	1 (1.7%)
Sensation of vaginal bulge	Never	47 (78.3%)
	Occasionally	9 (15%)
	Frequently	2 (3.3%)
	Daily	2 (3.3%)
Manual repositioning for micturition	Never	60 (100%)
Manual repositioning for defecation	Never	59 (98.3%)
	Occasionally	1 (1.7%)
Psychological strain	Not at all	50 (83.3%)
	Slightly	8 (13.3%)
	Moderately	2 (3.3%)
Postoperative quality of life (Likert)	Much better	45 (75%)
	Better	10 (16.7%)
	Same	4 (6.7%)
	Worse	1 (1.7%)
	Much worse	0 (0%)

DAC = double-layered anterior colporrhaphy, IQR = interquartile range, med = median, *n* = number, POP-Q = Pelvic Organ Prolapse Quantification, PVR = postvoid residual urine, tvl = total vaginal length

The response scale for postoperative QoL indicates an overall improvement (Table 1). Of the four patients with no change in QoL, all described stress and/or urge urinary incontinence; one patient additionally showed a recurrent cystocele and one patient a vaginal vault prolapse stage 3 and rectocele stage 3. One patient with decreased QoL suffered from stress urinary incontinence and pollakiuria.

Conclusion

The aim of this work was to investigate the outcome after DAC and to give a detailed description of the procedure. A high anatomical cure rate, frequent resolution of PVR and high patient satisfaction were observed. No organ injury or reoperation for hematoma due to DAC occurred. Throughout the investigated period, no reoperation for prolapse was required. One limitation of the study is the loss of 41% of patients to follow-up, which we consider acceptable given the retrospective design and the pandemic circumstances. Nonetheless, the lost patients might alter the results noticeably. A strength of our study is the high number of patients operated over a relatively short period, ensuring that the observed outcome is representative for the procedure detailed here. Furthermore, exclusion of other concurrent pelvic floor surgery prevents bias. With our video and detailed description of technique and procedures, surgeons can reproduce the operation and comparison between methods becomes feasible. Randomized controlled trials should follow.

Supplementary material The online version of this article (<https://doi.org/10.1007/s00192-022-05216-3>) contains supplementary material. This video is also available to watch on <http://link.springer.com/>. Please search for this article by the article title or DOI number, and on the article page click on ‘Supplementary Material’.

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Author contributions F. Graefe: Project development, data collection, manuscript writing, video editing

F. Schwab: Management of data analysis

R. Tunn: Surgical technique development, project development, manuscript editing, surgeon in recording, video editing

Declarations

Prior presentation 12th Women’s Health Debate Meeting, virtual, April 23, 2021

DAGG Online Forum operative Gynäkologie, virtual, September 23, 2021

32nd Congress of the Deutsche Kontinenz Gesellschaft, virtual, November 05, 2021

Consent Written informed consent was obtained from the patient for publication of this video article and any accompanying images.

Conflicts of interest None.

References

1. Maher C, Feiner B, Baessler K, Christmann-Schmid C, Haya N, Brown J (2016) Surgery for women with anterior compartment prolapse (review). *Cochrane Database Syst Rev*. <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD004014.pub6/full>. Accessed 06 April 2021.
2. Halpern-Elenskaia K, Umek W, Bodner-Adler B, Hanzal E. Anterior colporrhaphy: a standard operation? Systematic review of the technical aspects of a common procedure in randomized controlled trials. *Int Urogynecol J*. 2018;29:781–8. <https://doi.org/10.1007/s00192-017-3510-5>.
3. Fairclough E, Segar J, Myers J, Smith A, Reid F. Surgical technique used in the UK for native tissue anterior pelvic organ prolapse repair (VaST). *Int Urogynecol J*. 2020;31:1519–25. <https://doi.org/10.1007/s00192-019-04103-8>.
4. Walters MD. Surgical Correction of Anterior Vaginal Wall Prolapse. In: Walters MD, Karram MM, editors. *Urogynecology and Reconstructive Pelvic Surgery*. 3rd ed. Philadelphia: Mosby/Elsevier; 2007. p. 234–45.
5. Walters MD, Weber AM. Anterior vaginal prolapse with and without genuine stress incontinence. In: Cardozo L, Staskin D, editors. *Textbook of Female Urology and Urogynaecology*. 1st ed. London: Isis Medical Media; 2001. p. 587–97.
6. Bump RC, Mattiasson A, Bø K, Brubaker LP, DeLancey JO, Klarskov P, Shull BL, Smith AR. The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am J Obstet Gynecol*. 1996;175:10–7. [https://doi.org/10.1016/s0002-9378\(96\)70243-0](https://doi.org/10.1016/s0002-9378(96)70243-0).
7. Baessler K, Kempkensteffen C. Validation of a comprehensive pelvic floor questionnaire for the hospital, private practice and research. *Gynakol Geburtshilfliche Rundsch*. 2009;49:299–307. <https://doi.org/10.1159/000301098>.
8. Graefe F, Marschke J, Dimpfl T, Tunn R. Vaginal vault suspension at hysterectomy for prolapse – myths and facts, anatomical requirements, fixation techniques, documentation and cost accounting. *Geburtshilfe Frauenheilkd*. 2012;72:1099–106. <https://doi.org/10.1055/s-0032-1328061>.
9. Marschke J, Pax CM, Beilecke K, Schwab F, Tunn R. Vaginal hysterectomy with apical fixation and anterior vaginal wall repair for prolapse: surgical technique and medium-term results. *Int Urogynecol J*. 2018;29:1187–92. <https://doi.org/10.1007/s00192-018-3600-z>.

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