

Are double-J stents in surgery for deep infiltrating endometriosis always necessary? A retrospective analysis

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Abstract

Introduction: The therapy of deep infiltrating endometriosis places the highest demands. Double-J (DJ) stent insertion is recommended preoperatively. However, we could not find any publication in PubMed that showed the relevant advantages of double-J stent insertion in surgery of deep infiltrating endometriosis (DIE).

Aim: To report the advantages and disadvantages of inserting double-J stents in surgery for deep infiltrating endometriosis.

Material and methods: All patients who underwent surgery for deep infiltrating endometriosis at Academic Hospital Cologne Weyertal (a level III endometriosis center with up to approximately 900 endometriosis laparoscopic procedures annually) between January 2017 and September 2021 were included in this retrospective analysis. A total of 197 cases were included. The urinary tract complications were analyzed and they were divided into infections, pyelonephritis, urosepsis, intraoperative and postoperative ureteral lesions. Patients were divided into three groups: 1) with DJ stents in whom DJ stents were left in place postoperatively for at least 2 weeks, 2) with DJ stents in whom DJ stents were removed directly at the end of the surgery, 3) without DJ stents.

Results: There was a significant difference between all three groups in urinary tract complications: group 1 – 32%, group 2 – 11.6% and group 3 – 7%. The p-value of 0.01 shows statistical significance between group with DJ stents and the group without DJ stents. Urinary tract infection occurred in 25.5% in the first group, 11.6% in the second group and 3.6% in the third group. Here, too, the p-value shows statistical significance between the group with DJ stents and the group without DJ stents. Ureteral injury, on the other hand, occurred rarely and no statistically significant difference was found between group 3 and the total population, 3.6% versus 2.5%. In group 1, the injury rate was minimally higher, 6.4%. After comparing groups 1 and 2 with group 3, there was also no significant difference in ureter injury (6.4% vs. 3.6%, $p = 0.42$).

Conclusions: The authors of this study recommend that DJ stent insertion should not be part of the general preoperative preparation.

Key words: double-J stents, deep infiltrating endometriosis, laparoscopy, deep infiltrating endometriosis, endometriosis surgery.

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Introduction

Endometriosis is defined as the presence of endometrial tissue outside the uterus [1]. Approximately 10% of all women of reproductive age are affected, with the number increasing to 35–50% in symptomatic patients [2, 3]. A distinction is made between cystic endometriosis, also known as an endometrioma, peritoneal endometriosis, and deep infiltrating endometriosis (DIE) [4]. Deep infiltrating endometriosis is defined as infiltration of the peritoneum of > 5 mm [5]. DIE is classified with #ENZIAN [6].

The prevalence of DIE is estimated to be a few percent of the population, approximately 6.5% of all endometrial lesions [5, 7]. DIE is symptomatic in over 95% of patients and requires extremely complex treatment. Endometriosis lesions on unilateral or bilateral uterosacral ligaments are frequently observed (64–95%). Endometriosis of the urinary tract is frequently seen in patients with DIE (52.6%) and complete obliteration of the pouch of Douglas (11–45%) and bowel involvement (7–19%) are not uncommon [8, 9]. Infiltration of the surrounding tissues may result in obstruction of the bowel or ureters and secondary hydronephrosis [10]. The DIE-related symptoms can be treated hormonally in most cases, but a complete cure cannot be achieved with this method. The return of symptoms can be expected if the hormonal therapy is interrupted. Moreover, sometimes progression of DIE can be observed even under hormonal therapy [11]. For these reasons and/or in the presence of organ obstruction, surgical therapy should be considered [11]. The therapy of deep infiltrating endometriosis places the highest demands on interdisciplinary cooperation, as surgical involvement of the gastrointestinal tract and/or the urogenital tract can lead to radical surgical operations [12]. The goal of surgical endometriosis therapy is to relieve pain, restore pelvic anatomy, and improve fertility. Thus, optimal therapeutic management includes resection of all endometriosis lesions and long-term treatment by avoiding persistence of endometriosis lesions [13–17].

Double-J (DJ) stent insertion is recommended as a preoperative preparation for better intraoperative visualization of the ureters, especially in cases of deep infiltrating endometriosis of the genitourinary tract [12]. However, we could not find any publication in PubMed that showed the relevant advantages of DJ stent insertion in surgery of DIE. Only a few publications described the use of DJ stent insertion in surgery

of DIE of the ureters. However, it was not possible to associate DJ insertion with a lower incidence of urinary fistulas or strictures because the studies in which all ureters were catheterized did not report their complication rates [18]. Therefore, we designed this study to determine whether DJ stent placement should be used in surgery for deep infiltrating endometriosis and what the advantages and disadvantages are.

Aim

There are very few publications describing the advantages and disadvantages of inserting DJ stents in surgery for deep infiltrating endometriosis. This study was intended to fill this gap.

Material and methods

All patients who underwent surgery for deep infiltrating endometriosis at Academic Hospital Cologne Weyertal between January 2017 and September 2021 were included in this retrospective analysis. Academic Hospital Cologne Weyertal is a level III endometriosis center with up to approximately 900 endometriosis laparoscopic procedures annually. An interdisciplinary procedure with general surgical and/or urological colleagues is performed at least once a week. The patients are admitted to the hospital preoperatively in preparation for the surgery. Until 2020, all patients received a DJ stent insertion, and from 2020, the DJ insertion was performed only in certain cases.

In this study, deep infiltrating endometriosis was classified according to #ENZIAN, with “A” representing vaginal and rectovaginal endometriosis, “B” representing endometriosis at uterosacral and cardinal ligaments, as well as pelvic wall endometriosis, and “C” representing rectum endometriosis. In addition, adenomyosis is described as “FA”, bladder wall endometriosis as “FB”, ureteral endometriosis as “FU”, and endometriosis on higher bowel segments as “FI”. For the remaining localizations, there is “F” plus the name of the localization [6]. Peritoneal and cystic endometriosis were not included. Since “DIE F Other” endometriosis was mostly located outside the pelvis (diaphragm, umbilicus, abdominal wall), it was not analyzed in this study. A total of 197 cases were included in the analysis. Patients stayed postoperatively for 7 to 10 days. Surgical reports, blood and urine laboratory, and intraoperative and postoperative urinary tract complications were analyzed. The urinary tract complications were analyzed and they were di-

vided into infections, pyelonephritis, urosepsis, intraoperative and postoperative ureteral lesions. These complications were determined by surgical reports, postoperative follow-up and laboratory control. The classification of DIE, complex adhesions in the pelvis, and ureterolysis (whether ureterolysis was performed) were also analyzed according to the surgical reports.

Patients were divided into three groups:

- 1) patients with DJ stents in whom DJ stents were left in place postoperatively for at least 2 weeks,
- 2) patients with DJ stents in whom DJ stents were removed directly at the end of the surgery,
- 3) patients without DJ stents.

Ethical approval

According to 15§ of the professional code of the North Rhine Medical Association IRB approval was not required for a retrospective study.

Results

The age of the patients ranged from 21 to 52 years. The majority of patients were between 26 and 35 years of age (Figure 1).

A hundred and forty-six (74%) patients had more than one symptom, of whom 82 (42%) patients had two symptoms, 46 (23.4%) patients had three symptoms, and 18 (9.1%) patients had four symptoms. Only one symptom was reported by 51 (26%) patients. Dysmenorrhea was the most common symptom, followed by dyschezia (Figure 2).

DJ stents were placed in 142 (72%) patients, with 95 patients having them removed immediately at the end of surgery and 47 patients having them left in place postoperatively. Fifty-five (28%) patients did not receive DJ stents.

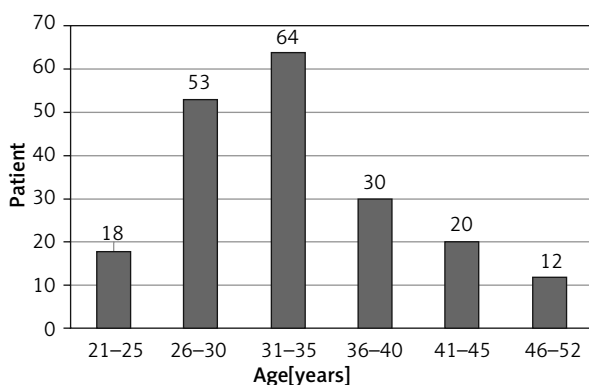


Figure 1. Patient age

Endometriosis was classified according to #ENZIAN. 111 patients had bilateral and 53 patients had unilateral “B” endometriosis. Complex adhesions were also analyzed (Table I).

For a better overview, the surgical procedures and complications of the urinary tract are presented in Table II. A total of 25 urinary tract infections occurred, with pyelonephritis in 4 cases and urosepsis in 1 case. Ureteral injury occurred in 5 cases (Table II).

The urinary tract complication rate in the total population was 15%. However, there was a significant difference between all three groups: group 1 – 32%, group 2 – 11.6% and group 3 – 7%. The *p*-value of 0.01 shows statistical significance between the group with DJ stents and the group without DJ stents. Urinary tract infection occurred in 25.5% in the first group, 11.6% in the second group and 3.6% in the third group. Here, too, the *p*-value shows statistical significance between the group with DJ stents and the group without DJ stents (Table II). In group 1 there was 1 case of urinary tract infection that developed into pyelonephritis and then urosepsis with a complicated course. In group 2, 3 patients developed pyelonephritis. In patients without DJ stents, no pyelonephritis was recorded.

Ureteral injury rarely occurred. In the whole population, a total of 5 cases were registered, 2 being intraoperative and 3 postoperative. No ureteral lesions occurred only in group 2. In groups 1 and 3, the rate of ureteral lesion was almost identical: 2% intraoperative in group 1 and 1.8% in group 3, and 4% had postoperative lesions in group 1 and 1.8% in group 3. The *p*-value shows no statistical significance for ureteral injuries (Table II).

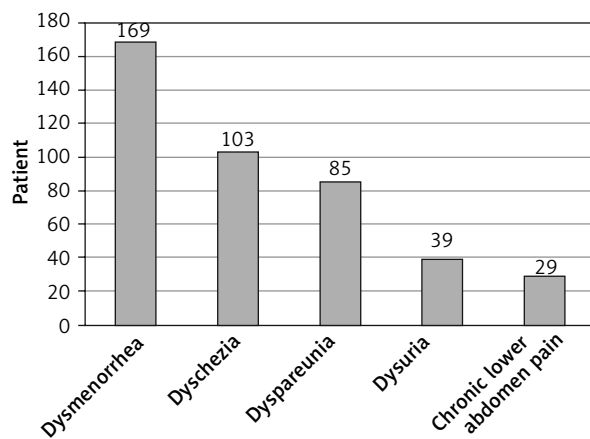


Figure 2. Overview of symptoms

Table I. Deep infiltrating endometriosis (#ENZIAN) and adhesions

Variable		Group 1*	Group 2**	Group 3***
All patients	197	47	95	55
A	164 (82%)	36 (77%)	84 (88%)	44 (80%)
1	17 (8.6%)	6 (13%)	8 (8.4%)	3 (5.5%)
2	57 (29%)	5 (11%)	32 (34%)	20 (36%)
3	90 (46%)	25 (53%)	44 (46%)	21 (38%)
B bilateral	111 (56%)	28 (60%)	48 (50.5%)	35 (64%)
B unilateral	65 (33%)	16 (34%)	36 (38%)	13 (24%)
B left	149 (76%)	37 (79%)	68 (72%)	44 (80%)
1	32 (16%)	2 (4.3%)	15 (26%)	15 (27%)
2	65 (33%)	10 (21%)	39 (41%)	16 (29%)
3	52 (26%)	25 (53%)	14 (15%)	13 (24%)
B right	138 (70%)	35 (74%)	64 (67%)	39 (71%)
1	42 (21%)	6 (13%)	24 (25%)	12 (22%)
2	54 (27%)	8 (17%)	29 (30.5%)	17 (31%)
3	42 (21%)	21 (45%)	11 (12%)	10 (18%)
C	108 (55%)	27 (57%)	52 (55%)	29 (53%)
1	26 (13%)	6 (13%)	13 (14%)	7 (13%)
2	32 (16%)	3 (6.3%)	18 (19%)	11 (20%)
3	50 (25%)	18 (38%)	21 (22%)	11 (20%)
F	113 (57%)	33 (70%)	39 (41%)	41 (74.5%)
FA	59 (30%)	8 (17%)	24 (25%)	27 (49%)
FB	19 (10%)	13 (28%)	3 (3.2%)	3 (5.5%)
FU	5 (2.5%)	5 (11%)	0	0
FI	30 (15%)	7 (15%)	12 (13%)	11 (20%)
Complex adhesions	137 (70%)	39 (83%)	63 (66%)	35 (64%)

*Patients with DJ stents, which were left. **Patients with DJ stents, which were removed. ***Patients without DJ stents. FA – adenomyosis uteri, FB – bladder, FU – ureter, FI – sigma.

Discussion

The therapy of endometriosis is complex. Sometimes a medical therapy is enough to reduce symptoms. For this goal the progestins are mostly used. Some authors describe the advantages of dienogest and etonogestrel implants in the medical therapy of endometriosis [19, 20]. Although sometimes medical therapy is enough to reduce symptoms and signs, in a large number of patients complete eradication, with a nerve-sparing and vascular sparing approach, is needed to restore the normal pelvic anatomy and its functions. Especially in intestinal endometriosis with symptoms the surgical treatment is important. Rafaelli *et al.* concluded that mesenteric vas-

cular and nerve sparing surgery in laparoscopic intestinal resection for DIE may be reproducible, safe and effective and could be combined with pelvic nerve-sparing surgery as an effective approach to improve intestinal symptoms after radical surgery for DIE [21]. For intestinal endometriosis a full-thickness excision, a shaving, or a bowel resection can be performed [22].

Surgical treatment of DIE is a very complex procedure. For severe endometriosis, data on the incidence of ureter injuries taking into account the severity of endometriosis and the degree of ureter involvement are lacking [23]. The initial visualization of the ureter helps facilitate the surgical procedure, as it is usually poorly visualized and not easily

Table II. Overview of surgery and complications of urinary tract

Surgery	All patients	Group 1*	Group 2**	Group 3***	Comparing groups 1 and 2 with group 3 p-value****
	197	47	95	55	
Ureterolysis	163 (83%)	41 (87%)	80 (84%)	42 (76%)	0.10
Bilateral ureterolysis	108 (55%)	32 (68%)	49 (51%)	27 (49%)	0.19
Unilateral ureterolysis	55 (28%)	9 (19%)	31 (33%)	15 (27%)	0.52
Bladder part resection	14 (7%)	10 (10.5%)	2 (2.1%)	2 (3.6%)	0.19
Complications	All patients	Group 1*	Group 2**	Group 3***	
	197	47	95	55	
All complications	30 (15%)	15 (32%)	11 (11.6%)	4 (7%)	0.03
Urinary tract infection	25 (13%)	12 (25.5%)	11 (11.6%)	2 (3.6%)	0.01
Pyelonephritis	4 (2%)	1 (2%)	3 (3.2%)	0	0.26
Urosepsis	1 (0,5%)	1 (2%)	0	0	0.72
Ureter injury	5 (2,5%)	3 (6.4%)	0	2 (3.6%)	0.42
Intraoperative ureter injury	2 (1%)	1 (2%)	0	1 (1.8%)	0.48
Postoperative ureter injury	3 (1,5%)	2 (4%)	0	1 (1.8%)	0.62

*Patients with DJ stents, which were left. **Patients with DJ stents, which were removed. ***Patients without DJ stents. **** Fisher's exact test.

distanced during the course of surgery [12]. For the purpose of improving the visualization of the ureters, insertion of DJ stents is suggested [12]. However, we could not find any publication in PubMed showing the advantages of preoperatively inserting DJ stents for endometriosis surgery. The second unanswered question is whether leaving the DJ stents in place prophylactically ensures protection of the ureters.

We compared three groups of patients: with DJ stents left in place (group 1), with DJ stents removed (group 2), and without DJ stents (group 3). No statistically significant difference was found between incidences of DIE types A, B, and C. However, in group 1, the incidence of extensive endometriosis (A3, B3, and C3) was the highest (Table I). Bladder and ureteral endometriosis also occurred most frequently in this group of patients. Ureterolysis was performed almost equally often in all groups, with bilateral ureterolysis almost identical in groups 2 and 3 but lower than in group 1 (Table II).

There was a significant difference between all three groups in terms of urinary tract infection, with it occurring most often in group 1 and least often in group 3 (32% vs. 7%) (Table II). Ureteral injury, on the other hand, occurred rarely and no statistically signifi-

cant difference was found between group 3 and the total population, 3.6% versus 2.5% (Table II). In group 1, the injury rate was minimally higher, 6.4% (Table II). After comparing groups 1 and 2 with group 3, there was also no significant difference in ureter injury (6.4% vs. 3.6%, $p = 0.42$). The low injury rate suggests that there is no difference for visualization and ureterolysis if DJ stents are placed. However, the postoperative infection rate is significantly lower in patients without DJ stents compared with both the overall population and groups 1 and 2.

Ureteral stenting is not free of side effects. Most patients have flank pain, storage symptoms, as well as dysuria, and hematuria often while the stent is in situ [24–29]. Moreover, the introduction of a foreign body into the urinary system increases the risk of bacterial colonization and bacteriuria, an inevitable process that begins once a stent is inserted and progresses with prolonged stent dwelling time; the majority of ureteric stents are colonized within a few weeks [30]. Complications such as stent dysfunction are also regularly observed. The procedure therefore also constitutes a relevant economic burden [31].

A urinary tract infection is very often neglected. However, patients with symptomatic urinary tract infection are often treated with antibiotics and these

can lead to long-term changes in the normal microbiota of the vagina and gastrointestinal tract and the development of multi-resistant microorganisms. The availability of niches that are no longer filled by the changed microbiota can increase the risk of colonization with multi-resistant uropathogens. If left untreated, urinary tract infections can eventually lead to bacteremia [32].

For these reasons, the authors of this study recommend that DJ stent insertion should not be part of the general preoperative preparation, but should only be performed in certain cases, such as in the case of confirmed ureteral stenosis with hydronephrosis or when ureteral reimplantation is planned.

Conclusions

Insertion of DJ stents is associated with high risk of pain and infection of the urinary tract. Therefore it should be performed only in certain cases (e.g. ureteral endometriosis, ureteral obstruction, hydronephrosis, extensive pelvic wall endometriosis). In addition, a urinary tract infection should not be neglected.

Conflict of interest

The authors declare no conflict of interest.

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