Fistulele rectouretrale – complicație a chirurgiei
minim invazive pentru cancer prostatic localizat

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Abstract

The recto-urethral fistula is an important issue in surgical activity, as its frequency has increased after the insertion of minimal invasive procedures in the treatment of organ-confined prostate cancer. The majority of this pathology is iatrogenic. The screening programs for prostate cancer have increased the number of diagnosed intracapsular cases, and consecutively, the number of curative procedures. The Rectal fistulas following radical prostatectomy, interstitial brachytherapy, cryotherapy, HIFU ablation are rare, but important from the urological and gastroenterological point of view. The latter side is relevant, because a lot of cases are late diagnosed during invasive rectal procedures.

Key words: prostate cancer, rectal injury, recto-urethral fistula

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**Introduction**

The recto-urethral fistula is a rare clinical issue and was redefined in the context of the new minimal invasive procedures performed for organ-confined prostate cancer. According to Culp and Calhoon ethiological classification, there are five different types of fistulas: congenital, iatrogenic, posttraumatic, neoplastic and inflammatory [1].

The large majority are iatrogenic, following prostatic and rectal surgery. The curative procedures performed in patients with prostate cancer are the most frequent causes of the pathology [2].

The extended practice of radical prostatectomy, interstitial brachitherapy, high intensity focused ultrasound (HIFU) ablation and cryotherapy is the origin of an important issue in contemporary surgery which balances two elements: the oncological outcome and the quality of life.

The diagnosis of iatrogenic fistulas is suggested by the postoperative development of: phaecaluria or pneumathuria, haemathuria, recidivant urinary tract infections. Rectal digital examination may objectivate the fistula. For details regarding trajectory, topography, diameter, it is important to perform complementary endoscopic procedures – urethro-cistoscopy, rectoscopy and radiological evaluation – retrograde urethrography.

**Laparoscopic Radical Prostatectomy**

Laparoscopic radical prostatectomy (LRP) is one of the major risk surgical interventions that can lead to rectal injury. The incidence of rectal lesions in general, and fistulas in special, is 1-2% after LRP [3,4]. Rectal damage can be produced during two major moments of the surgical procedure: the incision of the Denonvilliers fascia posterior to the base of the seminal vesicles, and the dissection of the lateral aspects of the prostate in direction of the apex, when the working space is considerably reduced (Fig.1)[5]. The fistula develops after rectal injuries that are not recognised during surgery, or after sutures made for damages that are recognised. The incidence of rectal injuries and recto-urethral fistulas after LRP, is summarised in Table I.

In a study on 110 cases of laparoscopic radical prostatectomy, Castillo has encountered nine cases of rectal injury. Two of them where not recognised intraoperatory and evolved to recto-urethral fistulas, a third case was recognised and sutured intraoperatory, but developed recto-urethral fistula postoperatory [6].

A larger study presented by Guillonneau analyzed intraoperatory rectal lesions in 1.000 patients. Thirteen cases of rectal injury were encountered, all sutured in double layer, without the need for colostomy, out of which only one developed recto-urethral fistula [3].

Another retrospective study on 1.000 patients diagnosed with prostate cancer, treated by laparoscopic radical prostatectomy, reported 33 cases of rectal injury sutured intraoperatory, of which one developed recto-urethral fistula. In another group of 952 LRP cases, 14 cases (1.5%) with late complications – recto-urethral fistulas and abscesses – were described. (4).

Stolzenburg indentified four cases of intraoperatory rectal injury (0.6%) in a retrospective study on 700 LRP procedures. The injuries were treated endoscopically, with a 2-layer suture. No rectal fistula was reported [7].

In a study on 900 patients, six cases of rectal injury and one case of recto-urethral fistula (0.1%) followed by colostomy were reported [8].

![Fig 1. Intraoperatory image during LRP. After retroprostatic dissection, the intimal adherence of the anterior rectal wall can be visualised, then easily opened and devascularised](image)

Castillo reviewed the incidence of rectal injuries in the first 110 consecutive laparoscopic extraperitoneal radical prostatectomies. Nine (8%) out of the first 110 laparoscopic extraperitoneal radical prostatectomies were complicated by rectal injury: six were diagnosed and repaired intraoperatory, and three were diagnosed postoperatory. The incidence of rectal injuries is prone to diminish with experience [9].

In our department, during the CLOSER screening program, one patient was diagnosed with prostate cancer and 53 LRP's were performed up to present. The patient developed late recto-urethral fistula (XV postoperative day), in the context of rectal devascularisation during dissection of Denonvilliers fascia. Colostomy and fistuloraphy by abdominal approach lead to resolution without relapse.
A last study on 184 patients with prostate cancer, treated by robot assisted LRP, reported no cases of rectal injury [10].

### Table I. The incidence of rectal injuries and recto-urethral fistulas after LRP

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<tr>
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<tbody>
<tr>
<td>No. Patients</td>
<td>110</td>
<td>1000</td>
<td>1000</td>
<td>900</td>
</tr>
<tr>
<td>Rectal injury</td>
<td>11</td>
<td>13</td>
<td>33</td>
<td>6</td>
</tr>
<tr>
<td>Recto-urethral fistula</td>
<td>3</td>
<td>1</td>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>

**Interstitial brachytherapy**

Prostate brachytherapy gives the advantage using intraoperative real time dosimetry. Thus, maximized tumor control and minimized normal tissue complications can be obtained (Fig. 2). Brachytherapy could be utilised in association with external beam radiotherapy in higher stage disease. For the last situation, the utilised dosage is 60% to 70% of that usually used for conventional brachytherapy [2].

Insertion of brachytherapy in the armamentarium addressing prostate cancer increased the frequency of recto-urethral fistulas [11]. A retrospective study suggested that this complication is induced by high doses of radiation [12].

A three year retrospective study conceived by Moreira, reported 11 cases of recto-urethral fistulas after brachytherapy, that necessitated colostomy and other procedures: cystoprostatectomy, prostatectomy, fistulorafy – York-Manson technique or omentum interposition [13].

As a complication of brachytherapy, recto-urethral fistula may occur up to three years after the procedure, as a 700 patient study proved. Within this group, the incidence of recto-urethral fistulas was 1%, of which one case was fatal [14].

The results of a single-center prospective study on 1,455 cases managed by interstitial brachytherapy alone, interstitial brachytherapy with external beam radiotherapy and salvage brachytherapy, reported three cases of recto-urethral fistulas (0,2%) among the patients who had received brachytherapy as monotherapy. The complication also followed endoscopic rectal procedures involving rectal biopsy. The study recommends fellow gastroenterologists to refrain from endoscopic biopotic rectal procedures, except for situations of high suspicion of rectal neoplasia [12].

Marguet reported six cases of recto-urethral fistulas in patients who underwent brachytherapy or external beam radiotherapy; the fistulas were consecutive to rectal surgery (for hemoroids) and to prostate biopsies. The complication appeared within an average time interval of 22.6 months [15].

A number of 49 patients with prostate cancer were diagnosed during the CLOSER program and were managed with brachitherapy. After the experience published by Kacso, which is the initial Romanian experience in prostate brachitherapy and brachytherapy combined with external beam radiation, there were no rectal injuries or fistulas.

Theoforescu, in a study on 754 patients treated with interstitial brachytherapy and external beam radiotherapy, as well as curie brachytherapy, reported seven cases of recto-urethral fistulas: one case after interstitial brachytherapy, two cases following brachytherapy combined with external beam radiotherapy, and four cases after curie interstitial brachytherapy. The complications occured 9-12 months after treatment completion, and were due to endoscopic prelevation of rectal tissue [16].

### Table II. The incidence of recto-urethral fistulas in the course of interstitial brachytherapy

<table>
<thead>
<tr>
<th></th>
<th>Shakespeare et al. [12]</th>
<th>Theoforescu et al. [16]</th>
<th>Shah et al. [14]</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. patients</td>
<td>1455</td>
<td>754</td>
<td>700</td>
</tr>
<tr>
<td>RUF after BT</td>
<td>3</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>RUF after BT+RT</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>RUF after salvage BT</td>
<td>-</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Deaths</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>RUF= recto-urethral fistula, BT= interstitial brachytherapy, RT= external beam radiation</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Cryotherapy for prostate cancer**

Cryotherapy has the main indication in T1c-T3 stages of prostate cancer, every grading and no interest for sexual potency. Anal fistula is an absolute contraindication for cryotherapy.
Salvage cryotherapy is indicated in radio-recurrent prostate cancer, with two aims: local control and improvement of overal survival [2]. Initial results were characterised by a high level of complications, recto-urethral fistula being the most important. This event could be early or late, as onset.

No recto-urethral fistula formation occurred after a total of 93 patients submitted to targeted cryoablation for organ-confined prostate cancer [17]; on the other hand, a five-year retrospective, multi-institutional pooled analysis of cancer-related outcomes after 975 cryosurgical ablation of the prostate reported recto-urethral fistulas in 0.5% cases [18].

Another comparative study on 49 patients, treated with curative cryosurgery and 42 patients treated with salvage cryosurgery, reported three cases of recto-urethral fistulas in the salvage group [19].

### High intensity focused ultrasound (HIFU)

The HIFU mechanism of action is based on the increase of local temperature of the prostate up to 100 degrees C, which leads to necrosis and cavity formation. Severe side effects are recto-urethral fistulas (6%), urinary incontinence (7%) and bladder cervix scleroses (17%) [2].

Thüroff encountered five cases of recto-urethral fistulas among 315 patients who underwent repeated HIFU [20], while Chaussy reported no case in a study on 184 subjects who underwent the same procedure [21].

The formation of recto-urethral fistulas, in the course of prostate cancer under HIFU therapy, is likely in the presence of a positive history of bowel pathology. A 146 patient study presented one case of recto-urethral fistula; this patient had positive history of hemicoleotomy and repetitive anal fistulas [22].

Other partial data on the initial results of HIFU indicate that a case of recto-urethral fistula occurs in every 20 patients [23].

Table III presents a comparative analysis on the incidence of recto-urethral fistulas following minimal invasive procedures for prostate cancer.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No. patients</th>
<th>Rectal injury</th>
<th>Recto-urethral fistula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopic Radical Prostatectomy</td>
<td>1000</td>
<td>1455</td>
<td>975</td>
</tr>
<tr>
<td>Interstitial brachitherapy</td>
<td></td>
<td>-</td>
<td>0.5%</td>
</tr>
<tr>
<td>Cryotherapia Long et al.[18]</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HIFU Thüroff et al.[20]</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Principles of the treatment of recto-urethral fistulas

Three principles are stated in the treatment of recto-urethral fistulas: first, digestive diversion (colostomy), prolonged urinary drainage and antibiotics are administered; second, the corrective intervention, in different approaches, is made; third, the close up of the digestive and urinary diversions is performed.

In 25% of cases, the fistula closes with colostomy and urinary drainage [24]. However, Culkin claims that the conservative treatment fails in all patients with recto-urethral fistulas [25]. In a study enclosing eight cases of recto-urethral fistulas, only one closed spontaneously after five months of catheterisation, the rest needing surgery, using the York-Manson technique. The authors consider colostomy and cistostomy not compulsory [26]. A paper on a 20 years-experience, discussed 23 cases of recto-urethral fistulas: in four cases the choice was conservative treatment (digestive diversion), all other cases were corrected surgically. When surgery was undertaken, treatment consisted in digestive and urinary diversions in 52% of cases, in digestive diversion in only 30% and in urinary diversion in only 4% of the cases. For patients relapsed after surgical treatment [27].

Many techniques and approaches have been described for the cure of recto-urethral fistulas: from the abdominal approach to the perineal one; posterior sagital or transspincteric, with or without omentum or muscular (gracilis or abdominal rectus muscle) interposition.

The York-Mason technique in the cure of recto-urethral fistulas secondary to prostate surgery is a feasible solution, as shown in a 30-years retrospective study by Renschler [28]. Another 15-years retrospective study on the same technique reports no relapse of iatrogenic recto-urethral fistulas corrected with the York-Mason technique [29].

The modified York-Mason (sagital transanal transrectal) approach for iatrogenic recto-urethral fistulas is considered to be simple, with minimal morbidity and 100% efficiency [30].

Culkin suggests that the transanal, transfincterian approach with flaps interposition has the advantage of an easy access, with surgical exposure and good identification of the fistula, and facilitates an adequate resection in vascularised tissue [31].

The success rate of surgery for recto-urethral fistulas depends on the dimension of the fistula and the presence or absence of urethral strictures. Elliot
reported a 93% success rate in the repair surgery of 16 cases of recto-urethral fistulas, consecutive to minimal invasive treatment for prostate cancer (radical prostatectomy, brachytherapy, external beam radiotherapy, cryotherapy, thermal ablation and any combination of these procedures) [32].

The different types of treatment for recto-urethral fistulas and their efficiency are presented in Table IV.

<table>
<thead>
<tr>
<th></th>
<th>Crippa et al. [27]</th>
<th>Garofalo et al. [28]</th>
<th>Castillo et al. [34]</th>
<th>Nyam et al. [44]</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. patients</td>
<td>8</td>
<td>23</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Colostomy</td>
<td>0</td>
<td>19</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Conservative treatment</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Relapse after conservative treatment</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Surgical treatment</td>
<td>7</td>
<td>19</td>
<td>2</td>
<td>13</td>
</tr>
</tbody>
</table>

In rectal injuries during laparoscopic radical prostatectomy, that are intraoperatively recognised, a double layer suture is made and no colostomy is needed. In these cases, the late formation of recto-urethral fistulas in the course can be managed by an anterior transsphincteric and/or a transanal surgical approach [33]. Castillo reports that in one case out of three cases, the resolution of fistulas after laparoscopic radical prostatectomy is possible by catheterisation [33]. Dagnis notes the resolution of the complication, in two similar cases, after a three step procedure: colostomy, transsphincteric correction of the fistula and close-up of the colostomy [34].

Wilbert obtained good results by combining transrectal endoscopic excision of the fistula, endoscopic suture, and simultaneous transurethral fulguration and fibrin application, in two cases of recto-urethral fistulas secondary to radical prostatectomy [35].

Another sagittal posterior approach, the Latzko technique, was applied with success and minimal morbidity in the treatment of seven cases of recto-urethral fistulas following radical prostatectomy [36].

Endoscopic transanal microsurgery is considered by Bochove-Overgaauw to be a minimal invasive procedure, for the cure of recto-urethral fistulas secondary to laparoscopic radical prostatectomy. Still, the experience is limited to two cases, in one of which the complication persisted [37].

Gracilis muscle transposition is described as an efficient solution for iatrogenic postiradiation recto-urethral fistulas, as well as for relapsing ones [38]. Potenti proved good results of the technique in a study on 11 patients with iatrogenic recto-urethral fistulas [39].

Marguet reported six cases of recto-urethral fistulas secondary to brachytherapy or external beam radiotherapy, in which conservative treatment failed. In two cases, exenteration was needed [40]. In similar patients, Lane successfully applied digestive diversion, closing of the rectum and gracilis muscle interposition [41], while Dreznik obtained good results without purging to enteral diversion [42].

A study compared the results on 14 patients with recto-urethral fistulas, secondary to open radical prostatectomy, brachytherapy and radiotherapy. Different techniques for closing of the fistulas were used: initial colostomy (7 patients), and various approaches: transanal repair (2 patients), parasacral repair (2 patients), transperineal repair (2 patients), coloanal anastomosis (3 patients) and muscle transposition (3 patients). Best results were obtained when urinary and digestive diversion, as well as muscle transposition, were performed [43].

A retrospective analysis over a 3-years period by Moreira reported 11 cases of recto-urethral fistulas following interstitial brachytherapy for prostate cancer, that necessitated colostomy, and other several repair surgical procedures: cistoprostatectomy, prostatectomy, Yok-Manson technique or omentum interposition [44].

In six of 150 patients with prostate cancer managed by cryotherapy, exenterative surgery was performed for serious complications, including uncontrollable hematuria, osteitis pubis, recto-urethral fistula, refractory perineal pain, bladder outlet obstruction and complete urinary incontinence [45].

**Conclusion**

The recto-urethral fistula is a feared complication by the urologic surgeon. The minimally invasive procedures for the cure of prostate cancer have set the objective of reducing rectal complications, but act as a condition that predisposes to the occurrence of recto-urethral fistulas through other procedures that follow in this area. The incidence of recto-urethral fistulas diminishes by gaining experience in these techniques, by avoiding invasive exploratory procedures of the rectum against the pathologic conditions, and by robotic assisted interventions.
Bibliografie

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