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Review

INCIDENCE AND PROGNOSTIC FACTORS OF RECTAL INJURIES DURING PROSTATECTOMY WITH ROBOTIC TECHNIQUE: A SYSTEMATIC REVIEW

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ABSTRACT

Rectal fistula is a rare complication that may occur during and after radical prostatectomy, regardless of the applied surgical technique. It accounts for about ≤ 1% of surgical complications. Patients who have undergone radical prostatectomy associated with prior pelvic radiotherapy, previous rectal surgery and transurethral re-section of the prostate have an increased risk for incidence of anorectal fistula. This review analyzes recent original studies and reviews. The studies evaluated deal with important prognosis and incidence rates, while studies related to the therapeutic resolution of the problem were excluded. The four different types of surgical techniques (ORP, RPP, LRP and RARP) to remove the prostate were also compared, in order to identify the best method associated with the fewest complications. This study aims to evaluate specific literature in order to understand which surgical technique is associated with the lowest risk of this complication, and the prognostic factors that lead to a higher risk of rectal injuries.

1. Introduction

A fistula is a pathological connection of tubular form between two structures, between two cavities of the organism, or between an organ and the outside of the body. They can involve virtually all organs of the body, and can form due to a variety of pathogenetic mechanisms. Fistulas, depending on their position, can be either internal, connecting two internal cavities, or external, connecting a cavity to the outside of the body. They can be divided into categories based on their structure: complete, when they are a connection between two cavities, or incomplete, when they are not yet a true connection. Another classification includes: unique or simple fistula, when it has a single channel of communication, or multiple, branched or multi-orifice-based, when dialing into multiple channels. Fistulas may affect all districts of the body, and involve virtually all structures. Anorectal fistulas are among the most common types, connecting the anal canal, or more rarely, the rectum with the perineal skin. Although the causes of these rectal injuries vary, infectious and inflammatory processes are certainly implicated in the development of this infrequent pathology. Progress in the urological field regarding iatrogenic rectourethral fistulas after radical prostatectomy is not clear. The radical prostatectomy is one of the major urologic surgical interventions with a number of possible operative and post-operative complications, but considering the evolution of surgical techniques and the ever-increasing experience of operating surgeons, the overall incidence of complications has decreased considerably over the last 10 years [1, 2].New techniques, such as the use of the platelet rich plasma (prp) adopted in many other surgeries, are being developed [3-13].The aim of this study is to highlight a standard incidence rate for this post-operative complication, and to recognize prognostic factors that significantly increase the rate of complications.

2. Studies concerning rectal fistula

Studies published in English over the last twenty-five years in databases like PubMed and Scopus were evaluated for this study.

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The following keywords were used to search through just over 120 publications: rectal injuries and radical prostatectomy, rectal fistula and prostate cancer, and rectal fistula during and after surgery. Data from 30 recent original studies and reviews were analyzed. All current studies in which patients had this complication were considered. We then compared the differences with the most modern instruments depending on the operation performed: open radical prostatectomy (ORP), laparoscopic radical prostatectomy (LRP) and robotic assisted radical prostatectomy (RARP). Only studies including important prognosis and incidence rates were considered and included, while all publications related to the therapeutic resolution of the problem were excluded.

The rectal fistula is one of the less frequent complications after radical prostatectomy, it accounts for about ≤ 1% as opposed to more frequent complications, such as incontinence and erectile dysfunction [14]. The first data reported in the literature occurred between 1992 and 1993, by Borland et al. and Mc Laren et al. [15,16].These studies showed an incidence of this complication below 1%. Risk factors associated with an increased incidence of anorectal fistula in patients undergoing radical prostatectomy in these early studies were: prior pelvic radiotherapy, a previous rectal surgery, and a previous transurethral re-section of the prostate. The high pT tumor stage was not initially considered a risk factor. In several studies published later, the incidence rate was almost always confirmed as ≤ 1%, except in rare cases where it was slightly higher. For instance, Masuda et al. [17] analyzed about 300 patients undergoing radical laparoscopic prostatectomy and found an incidence of 1.7%, with five patients who developed complications such as rectal injury and rectourethral fistula (RUF).

There are four surgical options for removing the prostate: (ORP) open radical retropubic prostatectomy, radical perineal prostatectomy (RPP), laparoscopic RP (LRP), and robot-assisted RP (RARP). Comparative studies of LRP versus ORP [19-20-21-22], RARP versus ORP [23-24], and LRP versus RARP [25] demonstrated that the incidences of rectal injury in ORP, LRP, and RARP were 0% to 3%, 0% to 2.8%, and 0% to 0.15%, respectively. The incidences of rectourethral fistula in RPP were reported to be 1 to 1.5%. No study showed a significant difference in the prevalence of rectal injury for any RP procedure, except for a retrospective study [26], which demonstrated that the risk of RUF was 3.06-foldhigher for RPP versus ORP. Mundy et al. [18], Mandel et al. [27] and Yldirim et al. [28] all showed a greater frequency of such complications in patients undergoing open radical prostatectomy vs robotic prostatectomy, just as it has been shown that patients undergoing radical prostatectomy after radiotherapy exhibited a significantly increased risk to develop an anorectal fistula. Tewari et al. [29] compared the three different surgical approaches on nearly 300,000 total prostatectomies performed, of which the incidence was 0.5% for open prostatectomy patients, 1% for laparoscopically treated patients and 0.3% for patients who had robotic intervention performed. Mandel et al. [27] analyzed about 24,178 patients (19,965 open RP, 4,111 robotic RP, 102 salvage RP). For patients with rectal injuries (RI), the following factors were evaluated: the patient and tumor characteristics, intra-operative and post-operative management, and additional complications due to the injury. To determine significant differences between patients with and without RI, T Tests, Mann Whitney U test, and multi-variate logistic regression analysis were performed.

Rectal injury occurred in 113/24,056 (0.47%) patients undergoing RP as opposed to salvage RP. In patients undergoing salvage RP after radiotherapy, RI incidence was very high (7/102, 6.86%).

To further identify risk factors for RI, tumor and patient characteristics, stratified by RI status, have been summarized in Table1.

	RI (n=113)	No RI (n=23943)
Age	63.2(58.9-67.6)	63.5 (59.1-68.6)
Prostate volume	43(31-55)	44(30-52)
BMI	26.6(23.9-28.1)	26.6(24.4-28.4)
D'Amico Risk group		
Low	10.3	33.2
Intermediate	41.4	47.0
High	48.3	19.8
Pre-operative PSA	17.2(5.7-18.8)	101.1(4.9-10.7)
Tumor stage		
p T2	32.5	66.1
p T3	64.2	33.4
p T4	3.3	0.5
Pathologic Gleason Group		
1	12.5	20.7
2	41.2	55.8
3	20.8	16.8
4	2.5	0.9
5	22.5	5.8
Node status p N1	25.8	8.3
PSM	33.3	17.5
Robotic RP	9.2	16.8

Table 1 - Characteristics of patients with and without rectal injury during radical prostatectomy (*PSA= prostate specific antigen; PSM= positive surgical margin)

Patients with higher pT stage, higher Gleason score or pN1 status had a significantly higher risk of RI. By contrast, patient characteristics such as age, body mass index and prostate volume did not differ between the groups. Gleason grade, pT stage, pN1 status and salvage RP were also confirmed as risk factors in invariable and multi-variable logistic regression analyses.

3. Conclusions

To date, although the post-prostatectomy rectal fistula represents one of the so-called minor complications, it is still of interest. This study assessed the incidence of this pathology by comparing the various previously performed operational techniques, the resolution of the problem, and also evaluated the most frequent common pre-disposition factors, which can be used for limiting and reducing the incidence rate. The data presented in the literature was analyzed and presented some interesting aspects; in the last few years, the already low incidence (<1%) can be reduced further (about 0.47%)[29,30]. In many studies, the lower incidence rate seems to be correlated with the technique used and robotic prostatectomy would appear to be the best choice [31-33]. The role of prognostic factors is very important, but remains controversial.

In fact, prior pelvic radiotherapy, previous rectal surgery and transurethral re-section of the prostate, certainly play important roles as prognostic factors in the development of rectal injuries, as documented by the analyzed results, but so could other factors, such as higher pT stage prostate cancer, higher Gleason score or pN1 status and possibly others. Therefore, further studies are required in order to identify the real prognostic factors, validate them, and determine their prognostic value.

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