



Iatrogenic Rectal Injury During Radical Prostatectomy: Is Colostomy Inevitable End?

Radikal Prostatektomi Esnasında Rektal Yaralanma: Kolostomi Kaçınılmaz Son Mu?

Prostatektomi Sırasında Rektal Yaralanma / Rectal Injury During Prostatectomy

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Özet

Amaç: Lokalize prostat kanserinde, radikal prostatektomi yüksek onkolojik başarıyı nedeniyle altın standart tedavi metodudur. Radikal prostatektomi sırasında iyatrojenik rektal yaralanma (İRY) nadiren görülür fakat bu durum prostat ve rektumun anatomik yakın ilişkisinden dolayı ciddi komplikasyonlara sebep olabilir. Amacımız kolostomisiz tedavi ettiğimiz iyatrojenik rektal yaralanma serimizi sunmaktır. **Gereç ve Yöntem:** Haziran 1999 ve Haziran 2013 yılları arasında aynı cerrah tarafından retropubik radikal prostatektomi (RRP) uygulandı. RRP sırasında 10 vakada (%2,6) rektal yaralanma oldu. Cerrahi esnasında fark edilir edilmez kolostomi diversiyonu uygulanmaksızın üç tabaka halinde rektal açıklık kapatıldı. Omental damarlı flep rektum ve vezikouretral anastomoz arasına yerleştirildi. **Bulgular:** İyatrojenik rektal yaralanma gerçekleşen vakaların klinik evresi sırasıyla 2 hastada T1c, 3 hastada T2a ve 5 hastada ise T2c idi. Operasyon öncesi Gleason skorları ise sırasıyla 3 hastada 6, 5 hastada 7 ve 2 hastada ise 8 idi. Rektal yaralanma olan 10 hastanın hiçbiri daha önce prostat veya rektum cerrahisi geçirmemiş ve operasyon öncesi radyoterapi ve hormon tedavisi almamıştı. **Tartışma:** Erken tanı ve rektum duvarının üç tabaka halinde kapatılması başarılı bir tamirin esasını oluşturur. Uyguladığımız yöntem rektal yaralanma tedavisinde güvenilir minimal invaziv ve oldukça etkili bir tedavi seçeneği gibi görünmektedir.

Anahtar Kelimeler

Prostatektomi; Rektal Yaralanma; İntraoperatif Komplikasyon

Abstract

Aim: Radical prostatectomy (RP) is the gold standard treatment method for localized prostate cancer, because of its high oncological success. Iatrogenic rectal injury (IRI) during RP is rarely seen, but it may causes serious complications because of the close anatomic relationship between the prostate and rectum. Aim is to present our series about management of IRI without colostomy. **Material and Method:** Between June 1999 and June 2013, radical retropubic prostatectomy (RRP) was performed to 372 patients by a single surgeon. 10 cases (%2,6) were complicated by a rectal injury during RRP. Instant rectal closure was performed in 3 layers without a diverting colostomy, at the time of surgery. Omental vascular flap was placed between rectum and vesicourethral anastomosis. **Results:** The clinical stages of IRI cases were T1c, T2a and T2c in 2, 3 and 5 patients, respectively. Their preoperative Gleason scores were 6, 7 and 8 in 3, 5 and 2 patient, respectively. None of the 10 had undergone previous prostatic or rectal surgery, or received preoperative radiotherapy or hormonal therapy. **Discussion:** Instant diagnosis and rectal wall closures by three layers are essential for successful repair. Our technique seems as a safe, minimal invasive and highly effective option for the management of IRI.

Keywords

Prostatectomy; Rectal Injury; Intraoperative Complication

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Introduction

Radical prostatectomy is the often preferred method for the treatment of localized and selected locally advanced prostate cancer because of its high oncologic success. Iatrogenic rectal injury (IRI) during open or robotic radical prostatectomy is relatively rare, but it may cause serious complications because of the close anatomic relationship between the prostate and rectum. Usually rectal injury during radical retropubic prostatectomy (RRP) occurred with an incidence of 0.5% to 9% [1,2]. In all surgical techniques, accidental rectal trauma is a serious potential complication after radical prostatectomy. However, IRI during prostatectomy will convert the case from clean-contaminated to contaminated, and this may bring the potential sequelae of abscess, fistula, sepsis, and rarely death.

Several invasive and non-invasive strategies for IRI management are advocated such as extensive preoperative bowel preparation, perioperative and postoperative antibiotics, opening colostomy, primary repair with or without the interposition of omentum [3,4].

The purpose of this study is to evaluate the management of IRI during open radical prostatectomy without necessitating colostomy and present our experience in managing this complication.

Material and Method

Between June 1999 and June 2013, RRP was performed to 372 patients for the management of localized prostate cancer at our hospital where is tertiary center with a urology residency program, and operations were done under the supervision of a senior surgeon. Ten cases (2.6%) were complicated by a rectal injury during RRP. We recorded the preoperative, operative and postoperative pathological data. Preoperative data were including the patient's age, medical and surgical history, body mass index, prostate specific antigen levels, clinical stage and biopsy Gleason score. Operative and postoperative data, including, operation time, volume of prostate, size of rectal injury, treatment of the injury, pathologic Gleason score, pathological stage, surgical margins status of the tumor, transurethral catheter removal time and treatment outcomes, were collected.

All cases had mechanical bowel preparation with a Fleet enema, the night before the surgery and received one dose of a parenteral first generation cephalosporin, preoperatively. When the patients were sustained about rectal injury, the prostatectomy was completed, and then the operative field was abundantly washed with saline and antibiotic irrigation. Firstly, digital rectal examination and then, air was insufflated into the rectum through the rectal tube, after filling the operative field with saline. After that, integrity of the rectum was evaluated by the way of air insufflations, whether air bubbles seen or not. All rectal defects were intraoperatively repaired in 3 layers without a diverting colostomy. Rectal mucosal layer, outer seromuscular layer and perirectal surrounding tissue were closed separately with absorbable running suture (2-0 monocryl). A pedicle-omental flap with vascular supply was mobilized and placed between the rectum and bladder to support the repaired tissue. After irrigating the pelvic cavity with an antiseptic solution, the vesicourethral anastomosis was performed with interrupted

sutures. The integrity of the vesicourethral anastomosis was confirmed by filling the bladder with 300 mL of sterile saline and drainage tube was placed in the Retzius space. Anal dilation was not routinely performed. Patients were allowed low residue diet after flatus had occurred and broad-spectrum antibiotics (500 mg metronidazole, 1 g ceftriaxone and 160 mg gentamicin all intravenously) were given for 3 days. The drain was removed, when the output was stop.

Results

The mean patient age was 61.3 years (range 48-74) and the mean body mass index was 24.8 kg/m² (range 21-28). The mean prostate specific antigen was 16.4 ng/mL (5.2 - 41.3) and the mean prostate volume was 65.7 g SD + (32 - 93). The clinical stage was T1c, T2a and T2c in 2, 3 and 5 patients, respectively. The preoperative Gleason score was 6, 7 and 8 in 3, 5 and 2 patients, respectively. Of the 10 patients 1 had been operated on previously for other gastrointestinal pathology, but none of the 10 had undergone previous prostatic or rectal surgery, or received preoperative radiotherapy or hormonal therapy. All of the patients were received 1g of cefazolin intravenously for prophylaxis and fasted for 6-8 hours before the operation. The mean operation time was 134 minutes (110-180). The preoperative characteristics of patients are summarized on Table 1.

Table 1. Preoperative data of patients who had exposed to iatrogenic rectal injury during retropubic radical prostatectomy.

Case	No	Age	Body mass index	PSA (ng/mL)	Biopsy Gleason Score	Clinical stage	Previous Surgery	Hormonal therapy or radiation
1	5th	48	21	7.7	6	T1c	No	No
2	9th	52	26	10.8	6	T2a	No	No
3	25th	61	24	5.2	7	T1c	No	No
4	39th	62	28	10	7	T2a	No	No
5	52th	74	25	30.1	7	T2c	Yes*	No
6	61th	63	22	8	7	T2a	No	No
7	91th	71	24	16.4	6	T2c	No	No
8	109th	55	27	41.3	8	T2c	No	No
9	125th	60	25	22.9	8	T2c	No	No
10	137th	67	26	11.6	7	T2c	No	No

*Gastrointestinal surgery

All of our rectal injuries had occurred during the apical dissection of the prostate and the separation of the rectourethral muscle. The approximate length of rectal injury was between 1 and 3 cm. Eight of 10 injuries were visually diagnosed intraoperatively and remaining 2 patients sustained about rectal injury during operation and rectal examination performed. After that, operative field abundantly filling with saline then checked by insufflating the air to the rectum through a rectal catheter to distend the lumen and looking for air bubbles in the fluid-filled pelvic cavity. By this method we diagnosed remaining 2 patients intraoperatively, and all IRI were instantly repaired. In one of the rectal injury occurred during apical dissection at the end of the RRP and his pathology report revealed surgical margin positivity in the apical region of the prostate. Surgical margin were negative in the other 9 patients. The water tightness of the vesicourethral anastomosis was confirmed in all 10 patients.

Histopathological examination revealed pT2a in 2 patients, pT2b in 2 patients, pT2c in 3 patients, pT3a in 2 patients and pT3b in 1 patient. Of the 10 patients, 2 cases had a pathologic Gleason score of 6, 6 cases had a Gleason score of 7 and 2 had a Gleason score 8. Only one of the patient's Gleason score was upgraded from 6 (3+3) to 7 (3+4). Operative and postoperative characteristics of patients are summarized on Table 2.

Table 2. Operative and postoperative patient characteristics

Case	No	Operative Time (minutes)	Prostate volume (g)	Rectal Injury Diagnosis	Pathologic Stage	Pathologic Gleason score	Injury treatment	Colostomy	Surgical margin
1	5th	180	38	Intraoperative	pT2a	3+3	Primary repair	No	Negative
2	9th	150	60	Intraoperative	pT2b	3+3	Primary repair	No	Negative
3	25th	155	90	Intraoperative	pT2a	3+4	Primary repair	No	Negative
4	39th	120	72	Intraoperative	pT2b	3+4	Primary repair	No	Negative
5	52th	140	32	Intraoperative	pT3a	4+3	Primary repair	No	Negative
6	61th	130	86	Intraoperative	pT3a	3+4	Primary repair	No	Negative
7	91th	115	93	Intraoperative	pT2c	4+3	Primary repair	No	Negative
8	109th	120	71	Intraoperative	pT3b	4+4	Primary repair	No	Positive
9	125th	110	65	Intraoperative	pT2c	4+4	Primary repair	No	Negative
10	137th	120	50	Intraoperative	pT2c	3+4	Primary repair	No	Negative

No complications were encountered during the postoperative period, and all cases healed primarily without colostomy with an average catheterization time of 13.1 days (range 8 to 21). The drains were removed between 4 and 6 days according to the volume of drained fluid for all cases. The hospital stay was between 6 and 15 days. No patient had fever or sepsis postoperatively. First 2 patients developed an anastomotic stricture and managed endoscopic incision and all were continent within 6 months postoperatively. No wound infections and no late rectourethral fistula occurred. All patients were operated on by the same surgeon.

Discussion

Rectal injury is a possible complication of RRP because of near anatomic relationship between the rectum and prostate. Although in the literature the incidence of rectal injury during RRP was 0.5% to 9% , it was reported to be as high as in a review of the studies of cases of salvage prostatectomy [1,2,5]. In our series we had a 2.6% incidence of IRI and injury was not missed in any patient. The rates of rectal tear are higher when the surgeon is unfamiliar with radical prostatectomy. Indeed, in a study rectal injury rates were reported of 2% among patients who were operated upon later in the study compared with 7.8% in the group of patients who were operated upon at the beginning of the study [6]. Similarly, in our cases of 6 rectal injury were occurred in the first 70 patients (cases 5th, 9th, 25th, 39th, 52th, 61th), and 4 were diagnosed in the later 70 (cases 91th, 109th, 125th, 137th). This can be explained by the systematization of the procedure and the gained expertise of the surgeons who performed it.

During RRP most rectal injury mainly occurs while dissection of the rectourethral muscle and cutting further into the anterior rectal wall [3, 4, 7]. In all cases, meticulous dissection remains the best precaution. It is noteworthy that the most of our rectal injuries (8 of 10) occurred during non-nerve sparing prostatec-

tomy. Although the primary reason is proximity of the rectum to the dissection plane can lead to trauma to its anterior wall, other reasons could be wide surgical resection to have a negative surgical margin and over self-confidence while performing surgery. A study showed that a surgeon's overconfidence could also result in rectal trauma [8]. To avoid accidental rectal lesion, the apex of the prostate should be meticulously dissected

by separating the rectourethral muscle from the posterolateral angle.

Predisposing factors for IRI are associated with periprostatic fibrosis and included previous prostate or rectal surgery, radiation and infection [2, 9, 10]. Previous hormonal therapy often distorts the surgical planes, because of that reason dissection can be more difficult [11]. In contrast, several studies failed to find an increased risk in cases with a history of open prostatic adenomectomy or transurethral resection [12]. Another predisposing factor is the duration between the date of the biopsy and the operation. It is thought that, time interval of at least one month between the biopsy and the RRP may have positive effects by enhancing the chances of resolving inflammation at the rectal wall and the periprostatic tissues. None of our ten patients had received hormonal therapy or radiotherapy. In one case had been operated on previously for other abdominal pathology. In our study the minimum interval between the date of the biopsy and the operation was 32 days.

Locally advanced tumors may result in difficult dissection either because of direct spread or desmoplastic reaction. However, Mayo Clinic reported that disease stage did not seem to have an impact on the incidence of rectal injury during RRP [9]. In our clinic for locally advanced prostate cancer extended radical prostatectomy performed. During extended radical prostatectomy for locally advanced prostate cancer to have a negative surgical margin we sometimes prefer anterior wall of rectal resection and primarily repairment of rectum without a diverting colostomy.

In the past extensive preoperative bowel preparation was generally advocated to decrease the rate of this important complication [9]. On the other hand, today optimal bowel preparation is controversial and generally not preferred. The disadvantages of bowel preparation, such as electrolyte and fluid disturbances, stooling during the operation if insufficient time has passed to complete the preparation and significant patient discomfort, have decreased its popularity among urologists. Some author reported that mechanical bowel preparation alone (cathartics, enemas, or lavage) might be sufficient to avoid serious sequelae [9]. In our clinic, the patients were instructed to have nothing orally 10-12 hours before the operation and were given a Fleet enema the night before the surgery.

It is particularly important to recognize rectal injuries during

the operations and most of IRI can be visually identified intraoperatively [3, 4, 7]. This complication is very important, because rectal laceration converts the case from clean contaminated to contaminated. If the injury is not recognized during the operation complications can be observed postoperatively. After surgery the most important complications are rectourinary fistulas, peritonitis, infections related to the operation site, urinary incontinence, anastomotic strictures, sepsis and even death [13, 5]. During the operation when we suspect rectal trauma we used digital rectal examination and insufflation air with a syringe into the rectum while filling the pelvis with irrigation fluid as described by some authors [9, 14]. Intraoperatively these easy applicable maneuvers help identifying the site of laceration, diagnosing missed injuries if IRI exist and removing blood clots that might obscure any actively bleeding vessels so that hemostasis can better be achieved. Some authors used a rectal probe to identify the rectal wall and rectourethralis muscle better during apical dissection, with a rectal injury rate of 1.6% and 1.4%, respectively [10, 15]. In all of our cases, the rectal injuries were recognized at the time of trauma and repaired in three layers with a vascular flap. We believe that no further complications were observed when rectal injury was recognized intraoperatively and repaired with omentum or another well-vascularized pedicle between the urinary and alimentary tracts. We have had a 100% success rate after primary three layered repair, and no complications.

We believe that meticulous rectal primary repair in three layers and omental interposition allows safe follow up and successful repair of rectal injuries without diversion colostomy. It is important to note that quality of the rectal repair is essential to obtain primary healing. Interposition of healthy tissue is an important component of rectal injury repair. Tissue interposition serves as a barrier to urea and the acid pH of urine that would otherwise inhibit healing of the rectal wound [16]. As a routine, colostomy is not required after primary repair of rectal wall. Colostomy may be necessary in limited cases with larger defects, intraoperatively missed defects, poor tissue quality, massive fecal spillage, fistula development, or in salvage radical prostatectomy procedures [13, 17, 18]. In the past systematic diverting colostomy was recommended but to avoid the added inconvenience, morbidity and cost of diverting colostomy in these cases, currently primary closure of the rectum without diverting colostomy has been advocated [19,20].

In conclusion, the experience gained in radical surgeries contributes to decline intraoperative complications. Rectal laceration during urological surgery requires meticulous intraoperative repair in three layers and it is reinforced by an omental flap, which allows primary healing without diversion colostomy. Early diagnosis and rectal wall closures in three layers are essential for successful repair. Our technique seems as a safe, minimal invasive and highly effective option for the management of IRI.

Competing interests

The authors declare that they have no competing interests.

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