



Seminal Vesicle-Rectal Fistula: A Review of an Unusual Complication Following Low Anterior Resection for Rectal Cancer

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Abstract

Introduction: Low anterior resection is the commonest operation in the United States of America undertaken for low rectal cancers. Seminal vesicle-rectal fistula is an extremely uncommon complication of this operation. The objective of this literature review is to investigate risk factors that lead to the development of seminal vesicle-rectal fistula; clinical presentation; and investigation and management options.

Methods: There were 9 articles of relevance which reported a total of 12 cases of seminal vesicle-rectal fistula. All other iatrogenic or cryptogenic fistula was excluded.

Results: 12 cases were identified in the literature, and we describe 1 further case. Pneumaturia and fever were presenting symptoms in 10 of 13 cases. 69.2% (n=9) of cases presented within 2 weeks of the procedure. CT was the investigation of choice in 9 of 13 cases. A variety of surgical and conservative management plans were utilized. Conservative management was successful in 46.1% (n=6) of cases.

Discussion: This study provides the first concise review of seminal vesicle-rectal fistula following low anterior resection and also adds a further case. It is also the first article of its kind to recommend a treatment algorithm which consists of a trial of conservative management.

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Introduction

In the United States of America there are 39 220 new cases of rectal cancer diagnosed each year [1]. Low anterior resection is a sphincter-saving procedure undertaken to treat low rectal cancers and can be undertaken laparoscopically or through an open procedure. Morbidity following anterior resection for rectal cancer is common and has been reported in up to 32.6% of cases [2]. Complications following low rectal anastomosis include leak, abscess, fistulae and anastomotic stenosis. Seminal vesicle-rectal (SV-R) fistulation is an uncommonly reported complication and as such there is no algorithm for the management of these patients [3-11]. In this review risk factors that lead to the development of SV-R fistula are highlighted and management options for this uncommon and challenging morbidity are proposed.

Surgical technique

Laparoscopic ultra-low anterior resection is typically performed with de-functioning loop ileostomy for patients with rectal cancer within 12 cm from the anal verge. Pre-operatively these patients often receive down-staging neo-adjuvant chemo-radiotherapy. Laparoscopic anterior resection is then performed after an interval of six to ten weeks to achieve R0 resection. A double staple technique using linear and trans-anal circular staple devices (e.g., CDH-29 Johnson & Johnson Ethicon) is performed to achieve anastomosis and restoration of bowel continuity. A de-functioning ileostomy is usually performed in the setting of previously irradiated tissue.

Methods

A MEDLINE search was undertaken over the date range 1974 to 2016. Inclusion criteria with search terms 'fistula', 'anterior resection' and 'seminal vesicle' were used. There were 9 articles of relevance which reported a total of 12 cases. All other iatrogenic or cryptogenic fistula was excluded.

Table 1: Clinical Presentation, Risk Factors and Management.

Author	Age	Disease Stage	Open or Lap	High or Low	Presenting Symptoms	Evidence of colitis	Day of Presentation	Right or Left veside	Imaging	An astomotic Leak	Anti biotics	Urinary Catheter	De-functioned
Goldman [3]	76	-	open	low	pneumaturia, testicular pain and frequency	No	28	Right	Cystogram, gastro-grafinnea, antegrade vasogram	Yes	Yes	No	No
Kawasaki [4]	52	-	open	low	pneumaturia, dysuria, fever, malaena and haematuria	No	15	Left	CT, water soluble contrast enema	Yes	Yes	-	Yes colostomy
Nakajima [5]	73	T3N0M0	open	low	pneumaturia, testicular pain and fever	No	37	Left	vasogram, fistula graphy, CT	Yes, intrapelvic drainage	Yes	Yes, urethral	No
Nakajima [5]	76	T3N1M0	open	low	pneumaturia, testicular pain and scrotal swelling	No	41	Right	water soluble contrast enema	No	Yes	Yes, urethral	Yes, transverse colostomy
Nakajima [5]	49	T4N2M0 (invading seminal veside)	open	low	Fever and faecaluria	No	10	-	CT, vasogram via cystoscopic control	Yes (excision site of seminal vesicles)	-	Yes, urethral	De-functioning ileostomy at Primary procedure
Sykora [6]	66	-	Lap	low	pneumaturia, testicular pain and scrotal swelling	No	11	Bilateral	Contrast irrigoscopy, CT	No	Yes	Yes, suprapubic	No
Hiraki [7]	40	-	open	low	Fever, Polyuria	No	14	Left	water soluble contrast enema, CT	No	-	-	Yes, ileostomy
Soda [8]	56	T3N0M0	Lap	low	Pneumaturia and dysuria	No	14	Left	CT, colonoscopy and fistulography	No	-	No	No
Mishima [9]	67	-	Lap	low	Pneumaturia, fever and dysuria	No	9	Right	CT	No	Yes	-	No
Mishima [9]	82	-	Lap	low	Pneumaturia, fever and testicular pain	Yes, C.diff +ve	13	Right	CT	Yes	Yes	-	No
Kitazawa [10]	53	T2N0M0	open	low	Pneumaturia, fever and diarrhoea	No	13	Right	CT	No	Yes	No	No
Akahane [11]	73	-	open	low	fever	No	5	-	CT	Yes	-	-	Yes, ileostomy
Dixon	67	T3N0M0	Lap	Ultra-Low	pneumaturia, fever, dysuria and frequency	No	53	Left	CT, water soluble contrast enema	Yes, Contained leak	Yes	No	De-functioning ileostomy at Primary procedure

Compliance with Ethical Standards

- Conflicts of interest
 - o Author A declares there he has no conflicts of interest
 - o Author B declares there he has no conflicts of interest
 - o Author C declares there he has no conflicts of interest
 - o Author D declares there he has no conflicts of interest
- Ethical approval
 - o The article does not contain ant studies with human participants or animals performed by any of the authors
- Informed consent
 - o Informed consent was obtained from all individual participants included in the study

Risk factors

SV-Rfistula is an extremely rare occurrence following low anterior resection for rectal cancer. Only 12 cases have ever been described in the literature [3-11]. As such there is no clear consensus to explain why they occur or which patients are at risk. Neo-adjuvant radiotherapy is routinely used to downstage rectal cancer prior to low anterior resection. This can be associated with a more challenging

surgical dissection as tissue planes can be fibrosed as a result of radiotherapy and dissection at the level of the distal rectum and seminal vesicles can be extremely difficult.

Previously reported SV-Rfistulae invariably occurred after 'low' anterior resection. No fistulation has been reported following high anterior resection where distal dissection of tissues does not routinely extend to the level of the seminal vesicles. Several reports suggest

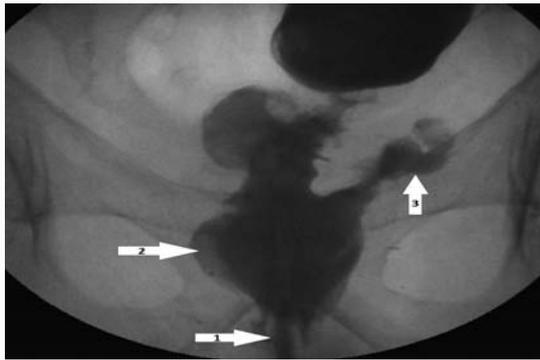


Figure 1: Water soluble contrast study demonstrating extravasation of contrast out of the neo-rectum with no clear fistula tract (1. Foley catheter in anal canal, 2. Contrast in neo-rectum, 3. Contrast extravasation out of bowel).

anastomotic dehiscence as a preceding event in the formation of SV-Rfistula. Gaining access to a narrow male pelvis can be difficult. Safe and accurate dissection avoiding injury to the seminal vesicles and fascial planes can be challenging. Laparoscopic techniques may provide the surgeon with an improved view using angled laparoscopes and greater access low in a male pelvis. However laparoscopic access does not appear to be protective as SV-Rfistulae is equally described in the literature in open and laparoscopic cases [3-11].

Iatrogenic injury either by enbloc seminal vesicle resection or inadvertent incorporation of the seminal vesicles during stapling at the time of anastomosis is also postulated as a potential risk factor [5]. In this single reported case the patient had malignant disease invading the seminal vesicles which were resected enbloc [5].

Clinical Presentation

On review of the literature it is widely accepted that fever and pneumaturia are the commonest presenting symptoms. Fever is described in 10 of 13 cases [4-7,9-12] and pneumaturia in 10 of 13 cases [3-6,8-11]. Fever is of course a very non-specific symptom whereas pneumaturia should be considered highly suggestive of fistulation between urinary tract and a newly formed low rectal anastomosis in any setting. Other presenting symptoms of urinary tract irritation or infection were also described such as frequency, dysuria and testicular pain or swelling. Presentation of symptoms is reported anywhere between post-operative day 5 to 53, however the majority of patients presented within the first 2 weeks post operatively (Table 1).

Investigation

The most common investigation of choice for detection of SV-Rfistulae is computed tomography. This was used to identify 11 of 13 cases [4-11] and would also be the best modality to identify evidence of anastomotic leak. Contrast studies such as water soluble contrast enema, fistulography, vasogram and irrigoscopy were also used in some cases. In order to confirm resolution or healing a water soluble contrast enema was found to be the most widely used imaging modality (Table 1).

Management

There are several options for the management of SV-Rfistula, ranging from conservative measures to rather extensive surgical intervention. Conservative treatment with antibiotics only can be successful [5,6,8-10]. In four cases authors described catheterization



Figure 2: Axial view Computed Tomography imaging demonstrates fistula between neo-rectum, left seminal vesicle and bladder (1. Anastomosis staple line, 2. Neo-rectum, 3. Gas in fistula tract, 4. Seminal vesicle, 5. Urinary bladder).

of the bladder in order to reduce intra-vesical pressure and encourage healing. This was achieved trans-urethrally in three cases [5] and supra-pubically in one [6]. Four of the thirteen reported cases underwent de-functioning of the anastomosis using a proximal stoma; two via colostomy [4,5] and two via an ileostomy [7,11]. Seven cases reported successful resolution without stoma formation [3,5,6,8-10].

The earliest case of SV-R fistula was documented in 1989 by Goldman who described undertaking a cutaneous vasostomy in order to drain sepsis [3]. In this case clinical symptoms settled after a prolonged period however the patient then developed recurrence and died of metastatic disease. The use of cutaneous vasostomy is unlikely to be necessary and subsequently has not been used in any other cases. Nakajima reported SV-R fistulation in a patient with an extensive rectal cancer invading the seminal vesicles requiring enbloc excision [5]. Following failed conservative management, subsequent attempted fistula closure using initially a gracilis muscle flap followed by a rectus muscle flap was attempted both unsuccessfully. The patient eventually developed recurrence and underwent successful pelvic exenteration. Soda described fibrin glue administration directly into the fistula tract via colonoscopy [8]. The authors describe resolution of fistula symptoms with no recurrence at six months. Other studies have also shown safe and effective use of endoscopic fistula management in the form of fibrin glue [12]. Time to resolution appears to take months as opposed to years although there is not consistent documentation of resolution of symptoms and radiological evidence of fistula closure [3-11].

It can be hypothesized that a de-functioning loop ileostomy is either protective in the development of seminal vesicle-rectal fistulae, or prevents the detection of the phenomena and masks symptoms prior to ileostomy closure and clinical sequelae.

Aetiology

The commonest explanation given in the literature for the sequence of events leading to SV-R fistula is anastomotic leak, small pelvic abscess followed by development of fistula. Exposure of the seminal vesicles following dissection at the level of Denonvilliers fascia and subsequent local sepsis also at this anatomical level is a logical theory to fistulae development [3-5,9]. This was described in 3 cases with radiological evidence of a leak (Figure 1).

Post-operative colitis has also been proposed as a hypotheses

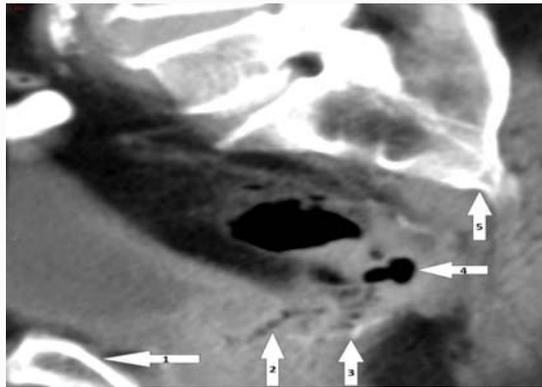


Figure 3: Oblique-sagittal reconstruction Computed Tomography imaging demonstrating fistula tract between neo-rectum and seminal vesicle. (1. Pubic symphysis, 2. Fistula tract 3. Anastomosis staple line, 4. Neo-rectum, 5. Sacrum).

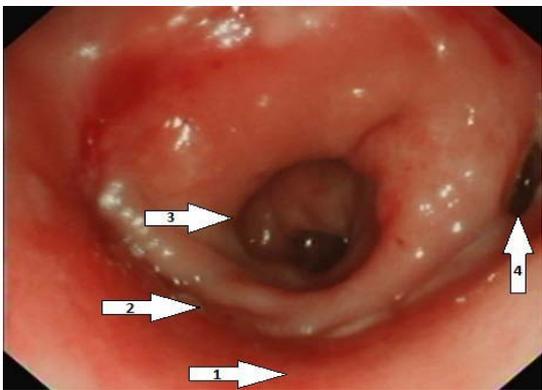


Figure 4: Flexible sigmoidoscopy demonstrates the anastomosis, true lumen and the fistula tract opening (1. Anal canal, 2. Anastomosis staple line, 3. Neo-rectal lumen, SV-R fistula tract).

associated with fistulae development [3,10]. Two authors described the development of bloody diarrhea following microscopic inflammation of the colonic mucosa (with or without positive clostridium difficile) and suggested that this level of intraluminal inflammation either lead to anastomotic incompetence or spontaneous fistula.

The anatomical difficulties encountered low down in a male pelvis can provide challenges in respect to view and access of surgical instruments. We hypothesize that on creation of the low anastomosis inadvertent involvement of erroneous tissue such as the seminal vesicle into the circular stapling device may go unrecognized and could potentially provide an explanation for the development of SV-R fistulae.

Conclusion

SV-R fistula following low anterior resection is an extremely rare phenomenon. This usually presents with pneumaturia and fever within two weeks following a low anterior resection in patients who have not had a defunctioning loop ileostomy. CT provides radiological proof of the abnormal communication and also evidence of an anastomotic leak. Clinical presentation may be delayed in the setting of a proximal diverting stoma. Conservative approach with antibiotics is successful in 46% of cases and is appropriate as most patients remain clinically well. However, if a conservative approach fails, a de-functioning stoma or endoscopic fistula management with fibrin glue can be considered.

Disruption of anastomotic integrity identified on contrast enema is associated with subsequent SV-R fistulation (Figure 1). CT scan can be used to demonstrate fistulae between the neo-rectum, left seminal vesicle, prostate and urinary bladder (Figure 2 and 3). Abnormal flexible sigmoidoscopy should also alert the clinician to the possibility of SV-R fistulation and may be used to access the abnormal tract if fibrin glue is deployed as a treatment modality (Figure 3). A third-line treatment modality which is reported with poor success but may be considered includes a muscular rotational flap in combination with proximal diversion (Figure 4).

Author Contributions

Study conception and design: Mark Katory.

Acquisition of data: Steven Dixon, Iain JD McCallum, Mark Katory.

Analysis and interpretation of data: Mark Katory, Steven Dixon, Iain JD McCallum, Chris Dennison.

Writing manuscript: Steven Dixon, Iain JD McCallum, Mark Katory.

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