
Two Case Reports Of Parastomal Herniation Of Small Bowel And A Literature Review Of Abdominal Stomas

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Abstract

Complications of stomas can be divided into early (occurring within thirty days) and late (occurring after thirty days). Parastomal herniation of small bowel is a rare early complication of abdominal stomas. There have been no previous reports of such a case in the literature to date. This article presents two cases of this complication which occurred recently at the Norfolk and Norwich University Hospital. A literature review of abdominal stomas is also presented.

CASE STUDIES

Case 1 was an 88-year-old Caucasian male who had an elective end colostomy for chronic faecal incontinence. He had a past history of a TURP (which had resulted in damage to the neck of the bladder), chronic pancreatitis, bilateral cataracts and a pacemaker. The procedure was performed laparoscopically. During the procedure there was some slight oozing, a loaded colon was found and mesenteric bleeding was stopped with diathermy and ties. The stoma was secured with vicryl to the sheath and monocryl to the skin. No problems were reported during the procedure. On day 2, postoperatively, the patient suffered a paracolostomy herniation of 15cm of small bowel, in the superior left region of the colostomy; 5-7cm of the apex was dusky and oedematous. A stitch was removed, the small bowel initially covered with soaked saline swabs and then reduced. The colostomy was repaired and the fascia closed with 3 stitches of 0-1 vicryl. He went home later that week.

Case 2 was a 78-year-old Caucasian woman who was admitted via the emergency assessment unit for faecal content in her urine, fresh PR bleeding, weight loss of 1 stone in 3 weeks and lower abdominal pain. She had a past medical history of COPD, diverticulitis, hypertension, osteoarthritis and had a previous haemorrhoidectomy and hysterectomy. A flexible sigmoidoscopy showed a rectal cancer with a colo-vaginal fistula, with bloods showing a septic picture. She was declared unfit for elective surgery, but after her condition deteriorated, had an emergency defunctioning colostomy formation and rectal washout on day 15 of admission. Five days after this, she had a

paracolostomy herniation of small bowel after the bridge of the colostomy was removed. Small bowel was viable and reduced and the rectus sheath was repaired with 0 PDS interrupted sutures and the colostomy was matured. She was transferred to HDU (High Dependency Unit) after surgery but died 3 days later. The death certificate was 1a) Multi-organ failure 1b) Malignant colo-vaginal fistula 1c) cancer of rectum 2) Hyponatraemia.

DISCUSSION

Acute parastomal herniation of small bowel is a rare condition. There have been no previous reported cases in the literature. The reasons why two such cases could have been seen close together is still not fully understood. Possible causative factors include surgeon-related factors such as surgical technique, and patient-related factors such as having conditions which cause increased abdominal pressure (e.g. bladder damage or chronic obstructive pulmonary disease). After seeing these two cases, we decided to review the literature on stomas.

There are several types of stoma, which can be divided into abdominal and non-abdominal. Abdominal stomas can be further subdivided into those which are used for feeding, irrigation or diversion/exteriorisation. This article reviews the current knowledge around the three main types of abdominal stoma used today - colostomies, ileostomies and urostomies, and updates the reader on recent advances in alternatives to ostomies.

HISTORY OF OSTOMIES

Until the late 1700s, bowel obstruction was almost always fatal. Physicians had no knowledge of antibiotics or sterile techniques, so they avoided any surgery that entered the peritoneum. Instead, they prescribed heavy metal such as mercury, laxatives and enemas to help move stool through the bowels. ¹ These did more harm than good. A French surgeon named Pilon performed the first colostomy surgery in 1776, by bringing out the caecum onto the skin, after all other treatment attempts had failed to help his patient. ² After surgery, the patient used what was probably the first stoma appliance: a sponge held to the opening with an elastic bandage to absorb any leakage. However, two weeks later the patient died of mercury induced bowel gangrene. ³ The first successful colostomy was performed by another French surgeon, Duret, in 1793 on an infant born without a rectum, who went on to live until the age of forty-five. The first recorded ileostomy was not until almost ninety years later, performed by a German surgeon, Baum, in 1879, for a malignant bowel obstruction; however, the patient died nine weeks later due to peritonitis from an anastomotic leak. ² The first urostomy was performed in 1851 on a child with congenital malformations but the child died soon after anyway. ⁴

Today, modern surgical techniques make ostomies a much safer procedure. Postoperative care has improved. Patients have access to specialised stoma nurses. Laparoscopic surgery is playing a greater role. Alternatives to ostomies are also becoming available.

DEFINITION & EPIDEMIOLOGY

A stoma is a surgically created opening, which connects a viscus to the outside environment. ⁵ Each year in the UK, around 12,000 colostomies are performed ⁷, around half being permanent. ⁸ Around 6000 ileostomies are performed each year in the UK ⁷ and around 2000 urostomies per year. ⁹ Emergency surgery (for bowel obstruction or perforation) comprises 10-15% of all stomas. ⁸ The cost per stoma appliance is around £1300 per year. ⁵

INDICATIONS

The most common underlying conditions resulting in the need for abdominal stoma surgery are colorectal cancer, bladder cancer and inflammatory bowel disease. ¹⁰

Colorectal cancer is the third most common cancer in the UK. ¹¹ Each year there are over 20,000 new cases of colorectal cancer in men and over 16500 new cases in

women in the UK. ¹¹ Bladder cancer is the fifth most common cancer in the UK. ¹¹ Each year there are around 10,100 new cases of bladder cancer in the UK. ¹² Ulcerative colitis and Crohn's disease are the most common reasons for ileostomy formation. Each year 5,000 people develop ulcerative colitis in the UK, ¹³ and in total, inflammatory bowel diseases affect approximately one in 500 people in the UK. ¹⁴

Generally, colostomies are performed if a more distal section of the colon has been removed or if a portion of the colon has been operated upon and needs to be rested until it is healed. In the latter case, the colostomy is often temporary and is usually reversed at a later date. Ileostomies are performed where disease or injury has rendered the entire colon incapable of functioning, typically because it has been partially or wholly removed. A urostomy is made in cases where long-term drainage of urine through the bladder and urethra is not possible.

TYPES OF STOMA

A colostomy connects a part of the colon to the skin. Colostomies can be end, loop, or double barrelled. An end colostomy is usually permanent and produced after an abdomino-perineal excision e.g., for a low rectal cancer. A Hartmann's procedure is performed after a resection of bowel when immediate anastomosis is not possible; the proximal end is brought onto the skin as a stoma and the distal end is left inside to heal. A loop colostomy is produced usually without a resection having been performed but where an inoperable rectal carcinoma is likely to obstruct. It usually has a bridge beneath it to prevent retraction for the first week or so, and has two openings. A Hartmann's procedure is where the sigmoid colon is resected and the proximal end is brought out onto the skin, leaving the distal end inside. It is temporary, allowing the bowel to heal before re-anastomosis and has one opening. If both ends are long enough to be brought out, this is called a double-barrel colostomy and is preferred to a Hartmann's procedure. Generally colostomies are usually constructed on the left hand side of the abdomen. They have a solid effluent which is intermittent. They are sutured flush with the skin.

In an ileostomy, a part of the small bowel is brought out onto the skin. Ileostomies can be loop or end. In a loop ileostomy, a loop of small bowel is brought out onto the skin. This is usually temporary. There will be two openings. An end ileostomy is usually permanent, created after a

panproctocolectomy has been performed and an ileal pouch cannot be created e.g. because of Crohn's disease. There will be one opening. Ileostomies are usually constructed on the right hand side of the abdomen. Their effluent is continuous and semi-solid. They are on a spout, to avoid irritating the skin. They are also known as a Brooke's ileostomy.

A urostomy connects the urinary system to the skin. There are several types including nephrostomy (between the renal pelvis and skin), ureterostomy (ureters and skin) and vesicostomy (urethra and skin). The most common is a ureterostomy, which can be created in several ways. It can be an ileal conduit (the ureters are detached from the bladder and joined to a short length of ileum), a single ureterostomy (only one ureter is brought to the surface), a bilateral ureterostomy (one ureter is brought out in each side of the abdomen), a double-barrel ureterostomy (both ureters are brought to the same side, two holes) or a transuretero-ureterostomy (both ureters are brought to the same side, one hole).¹⁵

CHOOSING A STOMA SITE

The presence of a stoma can be a psychological burden for a patient, and the burden is increased enormously if the stoma is badly sited or badly constructed.¹⁶ When choosing a stoma site, it is best to avoid bony prominences, the umbilicus, old wounds and scars, skin folds and the waistline. To reduce the risk of parastomal hernia, it should be constructed through the rectus muscle, not lateral to it.¹⁷

EMPTYING METHODS

Stomas can be incontinent or continent. An incontinent colostomy provides no voluntary control over the passage of stool or gas because unlike the anus, the stoma does not have a sphincter muscle.¹⁵ As a result, an appliance must be worn at all times. A continent colostomy is one where a catheter is used to flush it, allowing for the patient to not wear a pouch, but rather just a gauze cap over the stoma, and to schedule irrigation for times that are convenient.⁶ This is known as Koch's pouch ileostomy.

PRE-OPERATIVE MANAGEMENT OF THE PATIENT

Determining whether a stoma is necessary is a decision which needs to be based on a patient by patient basis. Due to lifestyle impact of the surgery, the decision is made after careful consultation with the patient. The patient should ideally be seen by a stoma nurse, who will mark an

appropriate place on the abdomen for the stoma and offer preoperative education on stoma management. In order to empty and cleanse the bowel, the patient may be placed on a low-residue diet for several days prior to surgery. Enemas may be used for procedures involving the left side of the large bowel.⁸ However, in an emergency situation all of these may not be possible.

POST-OPERATIVE MANAGEMENT OF THE PATIENT

After the operation, fluids and electrolytes are infused intravenously until the patient's diet can gradually be resumed, beginning with liquids. Usually within 72 hours, passage of gas and stool through the stoma begins. Initially, the stool is liquid, gradually thickening as the patient begins to take solid foods. The patient is usually out of bed in eight to 24 hours after surgery and can be discharged in two to four days,⁸ if there are no complications.

During the hospital stay, the patient should be educated on how to care for the stoma. A schedule of how often to change the pouch should be established. Regular assessment and meticulous care of the skin surrounding the stoma is important to maintain an adequate surface on which to attach the pouch. After leaving hospital, the stoma nurse should continue to see the patient to provide help. Dietary counseling may also be needed to help with normal bowel function.⁸

Following an ileostomy, the stoma effluent will have a high water and salt content. The patient should therefore increase fluid intake to prevent dehydration.¹⁸ With a urostomy, the condition of the ureters is monitored by investigations such as intravenous urography, repeated postoperatively at regular intervals.¹⁹

The recovery period for this surgery may vary between patients, depending on the patient's overall health prior to surgery and the patient's willingness to participate in stoma care.⁸

COMPLICATIONS OF STOMAS

Complications of stomas can be divided into early (occurring within 30 days) and late (occurring after 30 days). Early complications include haemorrhage, ischaemia, obstruction, retraction and high output from the stoma. Late complications include obstruction, dermatitis, prolapse, parastomal hernia, fistulae, abscesses and psychological problems.⁵

Ischaemia of stoma tissue is caused by inadequate blood supply; this complication is usually visible 12-24 hours after the operation and may require additional surgery. A retracted stoma functions at or below skin level. It may be due to not enough bowel being available to create a protruding stoma or due to retraction of the stoma itself. A retracted stoma can prove problematic because the stool has the tendency to pass underneath the appliance resulting in stool leakage and skin soreness. It can be treated by adding convexity or flexibility to the pouching system.²⁰ Stenosis (narrowing at the opening of the stoma) is often associated with infection around the stoma or scarring. Mild stenosis can be removed under local anesthesia. Severe stenosis may require surgery for reshaping the stoma. A prolapsed stoma is an increase in the length of the stoma. The causes include obesity, too large an abdominal opening for the bowel, increased intra-abdominal pressure (coughing, sneezing or vigorous peristalsis), multiple previous incisions or the stoma being sited outside the rectus muscle. In the event of a prolapse, it is recommended that the patient lie down and the stoma be covered with a warm damp cloth. The bowel can then be gently manipulated back in place. An abdominal binder or prolapse guard can be used to prevent the prolapse from reoccurring. If the prolapse is not resolved by the above measures, surgical repair or relocation of the stoma site may be necessary. A parastomal hernia is characterised by a bulging of the area around the stoma. The incidence of parastomal hernias is probably 30% to 50%.²¹ It can occur due to weak abdominal muscles or inadequate healing. It can result in a blockage or obstruction. Parastomal hernias are more commonly found when the stoma is sited outside the rectus muscle. They can be supported by a hernia belt or treated by surgical repair. Suture repair of a parastomal hernia or relocation of the stoma results in a high recurrence rate, whereas with mesh repair recurrence rates are lower.²⁰ Several mesh repair techniques are used in open and laparoscopic surgery, but randomized trials comparing various techniques and with long-term follow-up are needed for better evidence.²¹ The psychological acceptance of a stoma by a patient can require a great amount of psychological resources and social support. Systemic reviews show that in the short term, most patients experience negative feelings after stoma formation.²² Poor psychosocial adjustment to stoma surgery has been shown to correlate to depression and predict death later on.²³ Qualified nurses should encourage patients to express their feelings and seek counselling as needed, which may be provided by specialist stoma nurses.

Additional problems specific to ileostomies include short gut syndrome, electrolyte imbalance and dehydration. Malabsorption requires careful nutrition. Electrolyte losses, especially bicarbonate and potassium, need replacing, and dehydration requires increased fluid intake. Additional complications which are specific to urostomies include formation of pouch stones and sepsis. Stones occur when the urine is too alkaline. They can cause stomal irritation and bleeding. They can be prevented by keeping the stoma clean and maintaining acidic urine.²⁴ With orthotopic neobladder formation (see section on 'New advances - alternatives to the stoma', below), incontinence or hypercontinence may present unique challenges in patient management.²⁵

The rate of stoma complications varies from study to study, and has been reported to range from 10-70%,²⁶ depending on the methodology of the study, the length of follow-up and the definition of a 'complication'. Surgical technique and surgeon experience may also be a key factor.²⁷ Almost all patients will have some minor skin irritation and this is the most frequently reported stoma complication.²⁶ Patient gender, the presence of cancer, diverticulitis or stoma location and type were not associated with an increase in stoma complications.²⁸ However, obesity, increasing age, emergency surgery and inflammatory bowel disease has been shown to increase the risk of having a complication.^{28,29} Enterostomal nursing reduces the risk of having complications.²⁸ Overall, thirty percent of ostomies will need surgical re-intervention within the first ten years.³⁰

NEW ADVANCES - ALTERNATIVES TO THE STOMA

Alternatives to ostomies may avoid the need to wear a pouch on the skin, thus can be more acceptable to the patient. However, they are complex operations and are only available in a small number of specialist hospitals.

Alternatives to colostomies include total anorectal reconstruction and posterior sagittal anorectoplasty. Total anorectal reconstruction can be used to avoid end colostomies in patients who have undergone abdominoperineal excision. The technique involves recreating a stimulated neosphincter with the gracilis muscle or with the implantation of an artificial sphincter. Both techniques can be performed either at the time of the rectal excision or as a delayed operation, according to the patients' wishes.³¹ Most patients who have undergone anorectal reconstruction unfortunately suffer from incontinence to

some degree. However, the psychological benefit of avoidance of an abdominal stoma may outweigh the inconvenience of incontinence.³² Posterior sagittal anorectoplasty was used for the first time in 1980 to treat congenital anorectal malformations. This approach consists of a wide exposure, through a midline posterior incision, to determine the limits of the sphincter mechanism and to place the rectum within its limits. The posterior sagittal approach has also been used for the treatment of acquired conditions including tumours and fistulas. It can also have a role as an alternative to a stoma.³³

Alternatives to ileostomies include the ileal pouch-anal anastomosis (J-pouch), colonic J-pouch, transverse coloplasty and side-to-end anastomosis. The ileal pouch-anal anastomosis technique was first presented in 1986.³⁴ It is the most common surgical procedure for patients with ulcerative colitis.³⁵ It is also known as ileal reservoir reconstruction, ileal pouch-anal anastomosis, restorative proctocolectomy, or W-, S-, or J-pouch reconstruction. Pouchitis is the main complication, with fifty percent of patients experiencing at least one attack.³⁵ In 1986, two French centres were the first to report the use of a colonic J-pouch after low anterior resection.³⁶ Two separate meta-analyses showed the colonic J-pouch to be superior to the straight anastomosis in terms of anastomotic leak, faecal incontinence and stool frequency.^{37,38} The transverse coloplasty was first presented in 1999 by Swiss surgeons Z'graggen, Maurer, and Büchler.³⁹ The technique is similar to a pyloroplasty; the colon is opened longitudinally and a transverse coloplasty pouch is formed by closing the wound transversely. The continence-preserving neorectal reconstruction is completed by either a stapled anastomosis or a handsewn end-to-end pouch-anal anastomosis.³⁹ It results in similar bowel function outcomes to the colonic J-pouch³⁷; however, there is some evidence that the transverse coloplasty procedure results in more anastomotic dehiscences.³⁷ The advantages of the transverse coloplasty pouch are the simplicity of the technique and the facilitated tension-free anastomosis of the neorectum to the dentate line. This is a particular advantage in obese patients with a thick mesocolon and in individuals with a narrow muscular pelvis or a short mesocolon.³⁹ The side-to-end anastomosis results in similar bowel function outcomes as the colonic J-pouch, and may be considered in patients whose anatomy is not amenable to colonic J-pouch reconstruction.³⁷

Continent urinary diversion may surgically be carried out by

orthotopic bladder substitution, continent cutaneous reservoirs or rectal reservoirs. Orthotopic bladder substitution is the most commonly used and the most preferred type of continent urinary diversion, mainly because of the advantage of micturition through the patient's own urethra. However, this advantage has to be balanced against a significant rate of urinary incontinence, particularly night-time incontinence, reported as being between 17 and 34%.⁴⁰ Continent cutaneous urinary diversion with an ileocecal pouch is a highly satisfactory and safe option for patients, in whom orthotopic urinary diversion is impossible or contraindicated.⁴¹

CONCLUSION

Stoma operations form a large part of the colorectal surgeon's workload. The number of people living with a stoma in the UK is increasing. New techniques are becoming available as alternatives to stomas but are highly complex and not available everywhere.

References

1. History of ostomy surgery. Ostomy Medical Supplies. Available from: http://www.ostomy-medical-supplies.com/History_of_Ostomy_Surgery.html, accessed 5th August 2008
2. McGarity W. Salute to ET nurses. *Journal of Enterostomal Therapy* 1993;19(2): 40-41
3. Cromar C. The evolution of colostomy. *Dis Colon Rectum* 1968;11:256-280, 376-390, 423-446
4. Richardson R. The abdominal stoma: A historical surgery of the artificial anus. Queensborough Kent: Abbott Laboratories 1973
5. Longmore M, Wilkinson I, Turmezei T, Cheung CK. *Oxford Handbook of Clinical Medicine*. Oxford University Press. Oxford. 2008.
6. Stomas. Wikipedia. Available from: http://en.wikipedia.org/wiki/Stoma_%28medicine%29, accessed 5th August 2008
7. IMS Health Incorporated Group. New Stoma Patient Audit. 2001. IMS. Incorporated Group. London.
8. Encyclopaedia of Surgery. Colostomy. Available from: <http://www.surgeryencyclopedia.com/Ce-Fi/Colostomy.html>, accessed 5th August 2008
9. Incidence of urostomies. West Sussex Urology Support Group. Available from: http://website.lineone.net/~ramsey_martina. Accessed 5th August 2008.
10. Salter M. *Altered body image: the nurse's role*. 2nd ed. Bailliere Tindall, London 1997
11. Cancer Research UK. Available from: <http://info.cancerresearchuk.org/cancerstats/incidence/comm oncancers>, accessed 5th August 2008.
12. Bladder cancer. Cancer BACKUP. Available from: <http://http://www.cancerbackup.org.uk/Cancertype/Bladder>, accessed 5th August 2008.
13. White CA. *Living with a stoma*. Sheldon Press. London 1997
14. Inflammatory bowel disease basics. National Association for Colitis and Crohn's. Available from: <http://>

- <http://www.nacc.org.uk/content/ibd.asp>, accessed 5th August 2008.
15. Milwaukee Young Adult Ostomate Diversion Alliance of America. Ostomy types. Available from: <http://www.myodaa.org/ostomytype.htm>, accessed 5th August 2008.
 16. Irving MH, Hulme O. Intestinal stomas. *BMJ* 1992; Volume 304, June 27
 17. Sjö Dahl R, Anderberg B, Bolin T. Parastomal hernia in relation to site of the abdominal stoma. *British Journal of Surgery* 1988;75:339-341
 18. Encyclopaedia of Surgery. Ileostomies. Available from: <http://www.surgeryencyclopedia.com/Fi-La/Ileostomy.html>, accessed 5th August 2008.
 19. Encyclopaedia of Surgery. Urostomy. Available from: <http://www.surgeryencyclopedia.com/St-Wr/Ureterostomy-Cutaneous.html>, accessed 5th August 2008
 20. Mount Sinai Hospital Webpage. Complications of stomas. Available from: <http://www.mtsinai.on.ca/ibd/patient/ostomy/complications-stoma.htm>, accessed 5th August 2008
 21. Israelsson LA. Parastomal hernias. *Surgical Clinics of North America*. 2008;88:113-125
 22. Brown H, Randle J. Living with a stoma: a review of the literature. *J Clin Nurs* 2005;14:74-81
 23. Wade B. Colostomy patients: psychological adjustment at 10 weeks and 1 year after surgery in districts which employed stoma-care nurses and districts which did not. *Journal of Advanced Nursing* 1990;15:1297-1304
 24. Ostomy Medical Supplies. Complications of ostomy surgery. Available from http://www.ostomy-medical-supplies.com/Complications_of_Ostomy_Surgery.html, accessed 5th August 2008
 25. Farnham SB, Cookson MS. Surgical complications of urinary diversion. *World Journal of Urology* 2004;22:157-167(11)
 26. Wolff BG, Fleshman JW, Beck DE, Pemberton JH, Wexner SD, Church JM et al. Stoma complications. *The ASCRS Textbook of Colon and Rectal Surgery*. New York, NY: Springer 2007:693-712
 27. Cottam J, Richards K, Hasted A, Blackman A. Results of a nationwide prospective audit of stoma complications within 3 weeks of surgery. *Colorectal Dis* 2007;9:834-8
 28. Duchesne JC, Wang YZ, Weintraub SL, Boyle M, Hunt JP. Stoma complications: a multivariate analysis. *Am Surg* 2002;68:961-6
 29. Harris DA, Egbeare D, Jones S, Benjamin H, Woodward A, Foster ME. Complications and mortality following stoma formation. *Ann R Coll Surg Engl* 2005;87:427-31
 30. Kuijpers JH. Gastrointestinal surgery and gastroenterology. *Ned Tijdschr Geneesk* 2001;145:1144-8
 31. Devesa JM, López-Hervás P, Vicente R, Rey A, Die J, Fraile A. Total anorectal reconstruction: a novel technique. *Tech Coloproctol* 2005;9:149-152
 32. Abercrombie JE, Williams NS. Total anorectal reconstruction. *British Journal of Surgery* 2005;82:438-442
 33. Harry E. Bacon. The posterior sagittal approach: implications in adult colorectal surgery. *Dis Colon Rectum* 1994;37:1-11
 34. Lazorthes F, Fages P, Chiotasso P, Lemozy J, Bloom E. Resection of the rectum with construction of a colonic reservoir and colo-anal anastomosis for carcinoma of the rectum. *Br J Surg* 1986;73:136-8
 35. Hurst RD. Surgical treatment of ulcerative colitis. Available from: <http://www.geocities.com/hotsprings/falls/4809/surgicaltreatmentofulcerative.htm>, accessed 5th August 2008
 36. Lazorthes F, Fages P, Chiotasso P, et al: Resection of the rectum with construction of a colonic reservoir and colo-anal anastomosis for carcinoma of the rectum. *Br J Surg* 1986;73:136-138
 37. Brown CJ, Fenech DS, McLeod RS. Reconstructive techniques after rectal resection for rectal cancer. *Cochrane Database Syst Rev* 2008;16:CD006040
 38. Koh P K, Tang C L, Eu K W, Samuel M, Chan E. A systematic review of the function and complications of colonic pouches. *International Journal of Colorectal Disease* 2007;22:543-548
 39. Z'graggen K, Maurer CA, Büchler MW. Transverse coloplasty pouch - a novel neorectal reservoir. *Dig Surg* 1999;16:363-366
 40. Stein R, Fichtner J, Thüroff JW. Urinary diversion and reconstruction. *Curr Opin Urol* 2000;10:391-395
 41. Christoph W, Roland B, Raimund S, Elmar G, Sascha P, Hubertus R, Joachim T. Continent cutaneous urinary diversion: long-term follow-up of more than 800 patients with ileocecal reservoirs. *World Journal of Urology*. 2006;24:315-318(4)

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