CONTINENT GASTRIC POUCH BLADDER REPLACEMENT

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Abstract:

The use of the stomach for bladder enlargement and replacement has been known since Sinaiko’s work in a canine model. Mitchell et al. later showed that the use of the stomach for bladder replacement and enlargement had many advantages especially in situations of acute acid loading and azotaemia. The advantages of using the stomach included protection against hyperchloraemic acidosis, reduced mucus production and decreased urine infection rate, plus the elastic properties of the stomach.

We report the use of part of the stomach as a continent urinary reservoir to replace a missing urinary bladder and we discuss the advantages and disadvantages of using the stomach in the urinary tract.

Case Report:

X is a nine-year-old very cheerful and intelligent boy who has been suffering from urinary incontinence since birth. He was born with cloacal exstrophy. This is a rare congenital anomaly which is simply opening of the lower end of the gut and bladder onto the surface of the lower abdomen with wide separation of the symphysis pubis.

On the first day of life, in our hospital, his anomaly was corrected by separating the bladder from the gut, constructing a bladder and closing the opened pelvic ring. As he lacked all anal sphincter muscles the gut was tubularised and brought to the surface as an end colostomy.

The child grew up nicely but, as usual in such children, he remained incontinent. Two other operations, one in our hospital and another in King Faisal Specialist Hospital in Riyadh, failed to control his incontinence. Koch ileal continent pouch, then taking down this pouch and trans-ureterostomy and cutaneous ureterostomy. (Figure 1)

Reviewing this patient’s condition we realised that options were limited. The use of his small or large bowel was not wise, as these children are born with an inherently short bowel. Added to that, the failed trial of Koch pouch continent diversion had used at least 40 cm of small bowel and the multiple abdominal operations had caused many intestinal adhesions. This left the option of using part of the stomach.

At operation half the stomach together with its blood supply was separated and brought down to a level below the liver on the right side. We were limited by the short ureters and so the two united ureters were implanted into the posterior wall of this neobladder gastric pouch. Part of this gastric pouch was...
used to form a tube coming to the surface of the body for repeated catheterisation. At the upper end of this tube a flap valve was created to achieve continence. (Figure 3)

X recovered from his operation and did very well post-operatively. He is totally continent using clean intermittent catheterisation (CIC) where he catheterises his neobladder gastric pouch every three to four hours to empty it and keeps an indwelling catheter during the night. (Figure 4 & 5)

Post-operative nuclear scintography showed no obstruction or reflux. The pouch size was estimated to be 520 ml at one time and pouch pressure against time was no more than 13 cm H₂O even after five hours without evacuation.

The care of this pouch is very exact and any lack of compliance leads to electrolyte disturbances and dehydration, with which X was admitted several times until the family learned to cope with this new situation. We emphasised to the family the need to stick to a scheduled CIC program, as non-compliance would lead to obstructive phenomenon, as the pouch is 100% continent. X and his family are very happy with his new continent status. (Figure 6)

Discussion:

Bladder reconstruction in children attempts at providing a low pressure reservoir of urine that is continent and may be emptied completely at appropriate intervals. Parts of the GIT that can be used for this reconstruction include the ileum, colon and stomach. There have been varied opinions, both for and against the use of the stomach for reconstruction of the lower urinary tract.
The theoretical advantages of the use of the stomach in urinary reconstruction are active excretion of chloride instead of absorption (as in the ileum) reduced mucus production and favourable fibro-elastic properties. When the stomach is used the net chloride excretion supports the main buffer system of the urine (ammonium chloride) permitting active secretion of acid without the use of titratable acids and assisting the prevention of the ultimate depletion of other buffer systems based on bone metabolism. The ammonia is locked in the urine as a cation because of the active chloride excretion by the stomach. This results in reduced ammonia load and is of benefit to patients with marginal hepatic function. In chronic renal failure patients with acidosis the use of the stomach is beneficial for the same reason. There is also a reduced infection rate when the stomach is used possibly due to the acid content of the stomach juices as well as the reduced viscosity of the stomach mucus.

The stomach is used when no other part of the bowel is available as in patients with reduced bowel length, such as our patient, or patients subjected to lower abdomen irradiation. On the other hand, the use of the stomach, although an excellent option in reconstruction, has produced a known number of complications.

The stomach lining does not adapt to its new use, so the stomach lining of this pouch carries on executing acid and it is liable to the same conditions as the normal stomach such as peptic ulceration under stress and even perforation. Some patients complain of recurrent attacks of pouchitis which are relieved by histamine-2 receptor antagonists. As a part of acid production symptoms, some of these patients suffer from haematuria dysuria syndrome in which there are recurrent attacks of dysuria with haematuria which can be quite disabling. Some of these symptoms improve on taking histamine-2 receptor antagonist medications. As far as the malignant potential of the gastric lining is concerned, studies have not shown cancer development but they all recommend long-term follow up.

The incidence of stone formation in gastric pouches is much less than in other types of reservoirs unless the patient has a propensity for stone formation in an acid environment, as in the case of uric acid stones or if acid production is decreased as in cases where histamine-2 receptor antagonist is used. With the active excretion of chloride there is a propensity to hypochloremic alkalosis particularly if the patient is dehydrated. It is essential that these patients are kept well hydrated.

Amid the pros and cons of using the stomach there is sometimes the situation where there is no alternative, as in our patient, although nothing will fully replace the natural bladder God created for us. So, in all the options available for use to treat these conditions there are limitations and complications resulting from using some part of the body which was meant for another function.

**Conclusion:**

Gastric pouch bladder replacement continent diversion is a viable option in patients with cloacal extrophy and in other patients where it is not possible to use the lower gut.

**References:**