



How best to expose the entire surgical anal canal in the operative field during transanal pull-through for Hirschsprung's disease: a crucial step that determines success

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Abstract

Purpose During transanal pull-through (TAPT) for Hirschsprung's disease (HD), exposing the entire surgical anal canal (SAC) including the squamo-columnar junction, or anorectal line (ARL) is a crucial step for minimizing problematic post-operative bowel function. We present a hint for exposing the entire SAC.

Method Histologically, the ARL represents the junction of proximal unilayer columnar colorectal mucosa with distal stratified squamous epithelium and is the proximal limit of the SAC. It is an obvious landmark; proximal mucosa is vivid pink and distal mucosa is more whitish. We use the Lone Star (LS) self-retaining retractor system to expose the ARL. Before we attach the LS hooks to the anal sinuses on the dentate line full-circle, we place 3/0 sutures at 0, 3, 6, and 9 o'clock around the anus to expose the anal sinuses. If the patient's buttocks cannot be positioned as described or the patient is too high on the table, the LS ring does not sit well, resulting only in dilatation and lengthening of the SAC without prolapse. By hanging the patient's buttocks 5 cm over the end of the table, the LS ring sits snugly and the ARL and entire SAC prolapse to the anal verge.

Results Good positioning, as described, greatly facilitated dissection in 61/68 TAPT cases, while poor exposure hindered treatment in 7/68.

Conclusion Thorough exposure of the entire SAC, which is crucial for adequate TAPT, is greatly facilitated by patient positioning.

Keywords Hirschsprung's disease · Transanal pull-through · Anorectal line · Surgical anal canal

Introduction

Transanal pull-through (TAPT) is a common procedure for treating Hirschsprung's disease (HD). For commencing the rectal mucosal dissection (RMD), we use the anorectal line (ARL) as a landmark [1]. Since the ARL corresponds to the squamo-columnar junction histologically, and is the proximal demarcation of the surgical anal canal (SAC), it is excellent as a landmark for surgical intervention to prevent injuries that will contribute to problematic postoperative bowel function. Although the ARL is a distinct anatomical

landmark, a little extra knowhow is required to expose the entire SAC including the ARL clearly and patient positioning greatly influences the degree of visibility. Herein, we present a hint for exposing the SAC consistently as a crucial step for successful TAPT.

Materials and methods

TAPT using the ARL

Our TAPT is a modification of Georgeson's conventional procedure, which is described elsewhere [2, 3]. Briefly, laparoscopic dissection of the aganglionic segment is performed and superior rectal or sigmoid vessels are divided laparoscopically if needed. After preparing ganglionic colon for pull-through, we identify the ARL which is inconsistently represented as either the upper border of

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the sphincteric and puborectalis complex, or the top of the columns. We commence near full-thickness rectal dissection transanally progressing cranially for 15–20 mm in the plane of the rectal muscle layer, taking great care not to injure the internal and external anal sphincters. The plane of dissection is then changed and continued proximally between the rectal mucosa and the rectal muscle layers. The surgical anal canal and the sphincter muscle complex is preserved intact using this technique. After rectal mucosal dissection, total excision of the posterior rectal cuff is performed. The anterior rectal cuff proximal to the peritoneal reflection, up to and including the dissected part, is excised. The pull-through colon is anastomosed to the ARL using interrupted absorbable sutures [1].

Hint for exposing the ARL

We use the Lone Star (LS) self-retaining retractor system to expose the SAC and ARL for commencing RMD. To prepare, we place 3/0 sutures at 0, 3, 6, and 9 o'clock around the anus to expose the anal sinuses. We position the patient on the operating table so that the buttocks hang about 5 cm over the lower edge (Figs. 1a, b, 2a). In this position, the LS ring sits snugly and the ARL and entire SAC prolapses to the anal verge when the elastic stays attached along the dentate line are hooked to the retractor ring (Figs. 1a, b, 2b), resulting in nice exposure of the ARL (Figs. 1b, 2c). If the patient cannot be positioned as described or the patient is too high on the table without the buttocks hanging over the lower edge, the LS ring will not sit well, resulting only in dilatation and lengthening of the SAC without prolapse (Fig. 1c). Since we began using the ARL as a landmark for commencing RMD

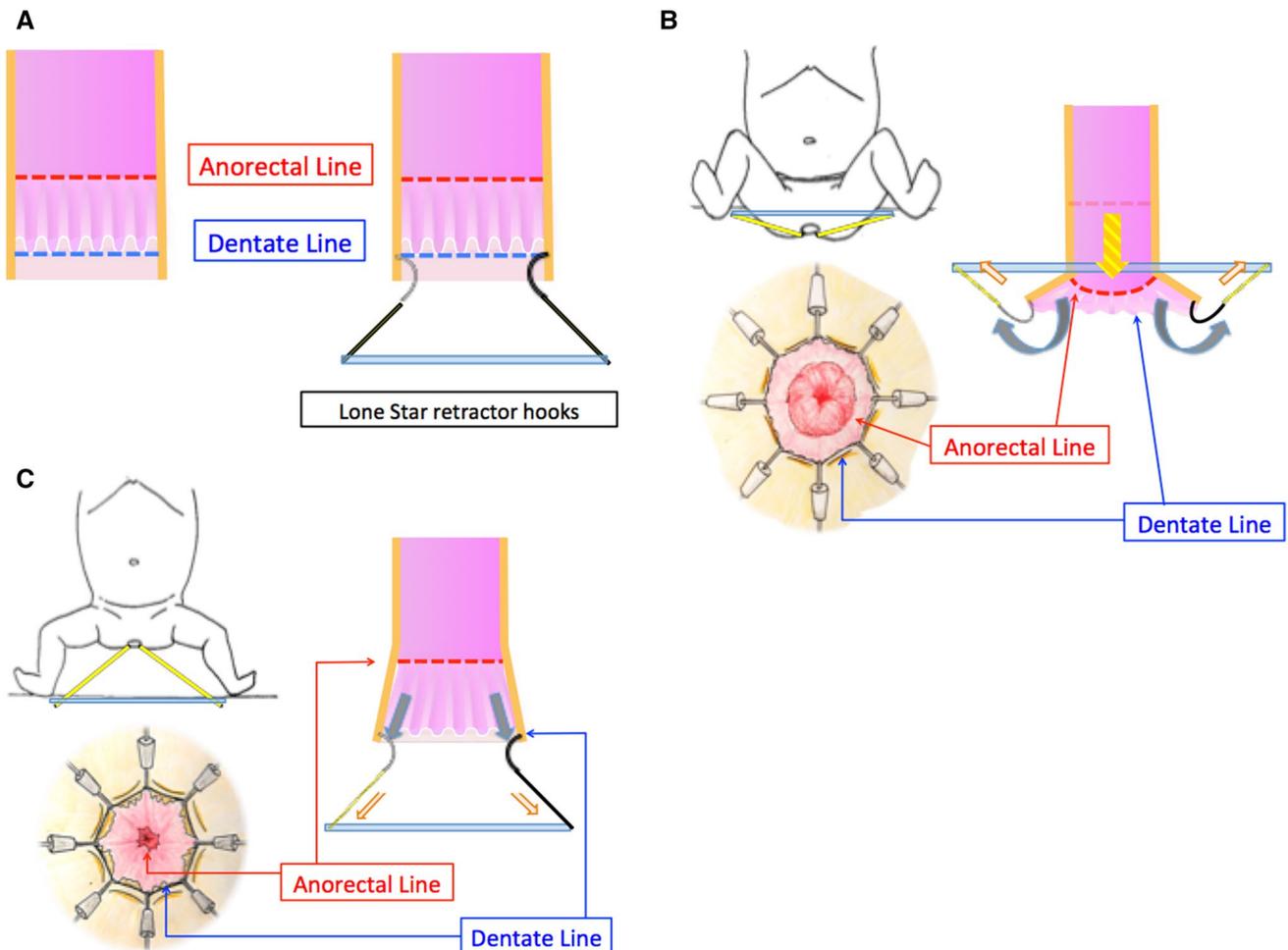


Fig. 1 Patient positioning and exposure. **a** The elastic stays of the Lone Star retractor system being attached along the dentate line. **b** The anorectal line prolapses to the anal verge and is exposed com-

pletely if the patient is positioned with their buttocks hanging over the end of the table. **c** The anorectal line and surgical anal canal cannot prolapse because the patient is positioned too high on the table

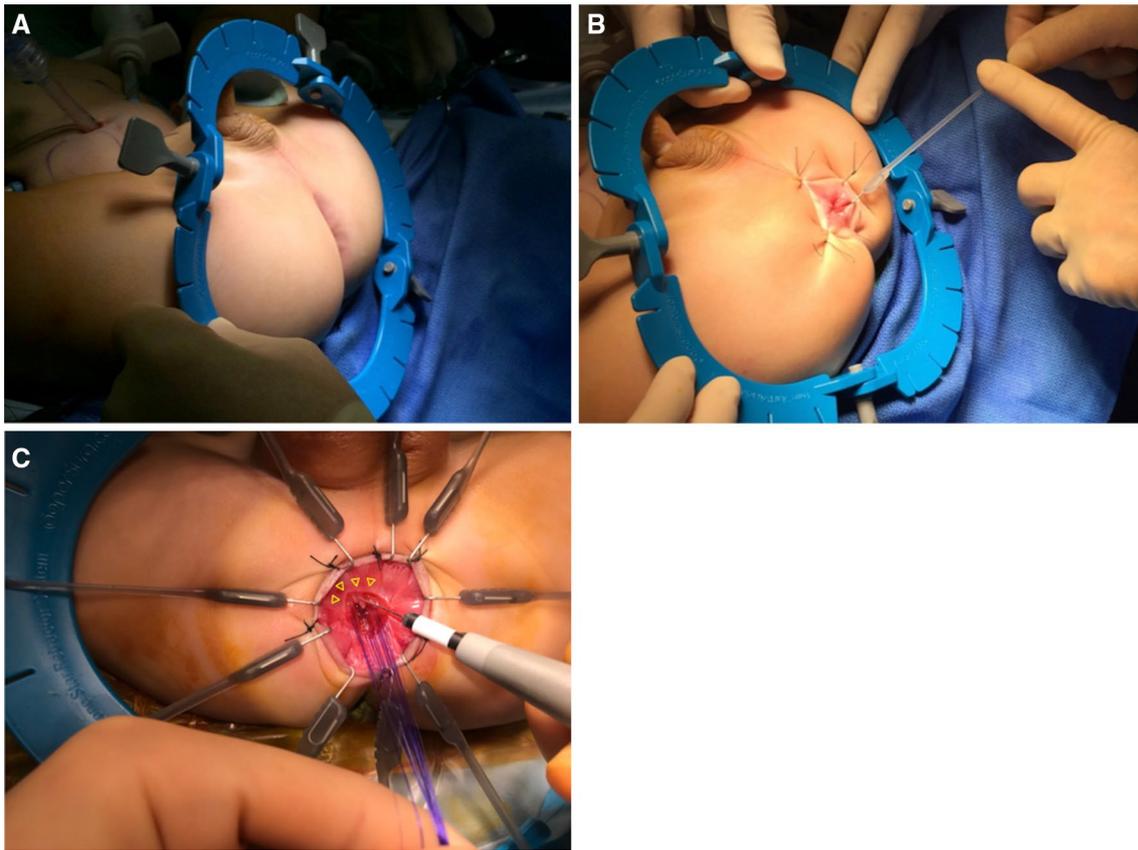


Fig. 2 Intraoperative appearance of a well-positioned patient. **a** The Lone Star retractor ring sits snugly when the patient's buttocks are positioned to hang over the end of the table. **b** 3/0 sutures being placed at 0, 3, 6, and 9 o' clock around the anus to expose the anal sinuses. An elastic stay attached along the dentate line is hooked to

the retractor ring. Note the snug fit of the ring retractor. **c** The elastic stays attached circumferentially along the dentate line are hooked to the retractor ring. The anorectal line (open arrowheads) can be seen clearly just distal to the multiple sutures that are used for traction during transanal mucosal dissection

in 2007, we have performed 68 TAPT procedures. Of these, 61 were positioned correctly and TAPT proceeded smoothly, while 7 could not be positioned correctly with poor exposure which hindered treatment.

Discussion

From experience, RMD commencing just above the ARL, which is an objective landmark, would appear to be associated with postoperative bowel function that is consistently reproducible and essentially normal with only occasional problems. This is because the surgical anal canal, the most critical part of the lower gastrointestinal tract for fecal continence and anal sensation, is nicely exposed and thus, protected, and the aganglionic rectum proximal to the ARL is fully excised. Previously when other landmarks, such as the dentate line, were used, there was a spectrum of

postoperative bowel function that was essentially random, since these landmarks are subjective, prone to variation, and not reproducible consistently. If RMD starts too proximally, some degree of aganglionic rectum is likely to be left behind causing constipation, and if RMD starts too distally, injury to the surgical anal canal will precipitate fecal incontinence in 100% of cases.

Being easily identified if exposed adequately, the ARL ensures good postoperative bowel function [1, 4] because histologically there is a demarcation that we recently proved in a mice model of HD [5] that changed the perspective of how we regard the innervation of the SAC and the relationship between normal bowel function and surgery. It is now quite clear that the ARL is the landmark to use for TAPT yet poor exposure prevents success. By simply hanging the buttocks over the end of the table in a stable way, and using a ring retractor device, the ARL is exposed clearly and RMD and TAPT are facilitated.

Conclusion

The little extra knowhow that will ensure successful TAPT is directly related to one of the basic principles of all surgery: good exposure/visibility. All patients should be positioned with their buttocks hanging over the end of the operating table, irrespective of how TAPT is performed, but we would also like to recommend that the ARL be used as the landmark for RMD because it is objective and postoperative bowel function is reliably consistent.

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