



Predictive value of the pediatric ulcerative colitis activity index in the surgical management of ulcerative colitis

Fabienne L. Gray^a, Christopher G. Turner^a, David Zurakowski^a, Athos Bousvaros^b, Bradley C. Linden^a, Robert C. Shamberger^a, Craig W. Lillehei^{a,*}

^aDepartment of Surgery, Children's Hospital Boston, Harvard Medical School, Boston, MA

^bCenter for Inflammatory Bowel Disease, Children's Hospital Boston, Harvard Medical School, Boston, MA

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Abstract

Purpose: The primary purpose of this study was to investigate the relationship between Pediatric Ulcerative Colitis Activity Index (PUCAI) and operative management. We also specifically evaluated those patients receiving tacrolimus for their disease.

Methods: A retrospective review (1/06-1/11) identified ulcerative colitis patients (≤ 21 years old) undergoing restorative proctocolectomy with rectal mucosectomy and ileal pouch-anal anastomosis. Main outcomes included pre-operative PUCAI, combined versus staged procedure, and postoperative complications. Patients receiving tacrolimus within 3 months of surgical intervention were identified. PUCAI at tacrolimus induction and medication side effects were also noted.

Results: Sixty patients were identified. Forty-two (70%) underwent combined and 18 (30%) had staged procedures. Pre-operative PUCAI was lower for combined versus staged patients ($p = < 0.001$). Furthermore, a higher pre-operative PUCAI strongly correlated with the likelihood of undergoing a staged procedure ($p < 0.001$). Forty-four patients (73%) received tacrolimus. Significant improvement in their PUCAI was noted from induction to pre-operative evaluation ($p < 0.001$). Minor and reversible side effects occurred in 46% of patients receiving tacrolimus, but complication rates were not significantly different.

Conclusions: There is a very strong correlation between the PUCAI and the likelihood of undergoing a staged procedure. A significant improvement in PUCAI occurs following preoperative tacrolimus therapy.

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Restorative proctocolectomy has become the preferred surgical treatment for pediatric patients with ulcerative colitis (UC) [1]. Ideally, resection and reconstruction can be

performed simultaneously, followed by subsequent closure of the diverting ileostomy. However, deep ulceration of the rectal mucosa or impaired clinical status may necessitate a staged approach with initial resection followed later by reconstruction and eventual ostomy closure. The Pediatric Ulcerative Colitis Activity Index (PUCAI, Table 1) is a validated, objective measure of clinical outcome developed to standardize the reporting of UC disease activity in the pediatric population. It is based on 6 quantifiable items easily

* Corresponding author. Craig W. Lillehei, MD, Department of General Surgery, Children's Hospital Boston, Harvard Medical School, Fegan 3, 300 Longwood Avenue, Boston, MA 02115. Tel.: +617 355 3039, fax: +617 730 0298.

E-mail address: Craig.Lillehei@childrens.harvard.edu (C.W. Lillehei).

Table 1 Pediatric ulcerative colitis activity index.

Item	Points
Abdominal pain	
No pain	0
Pain can be ignored	5
Pain cannot be ignored	10
Rectal bleeding	
None	0
Small amount only, in less than 50% of stools	10
Small amount in more than 50% of stools	20
Large amount, (> 50% of stool content)	30
Stool consistency of most stools	
Formed	0
Partially formed	5
Completely unformed	10
Number of stools per 24 hours	
0 – 2	0
3 – 5	5
6 – 8	10
> 8	15
Nocturnal stools (any episode causing wakening)	
No	0
Yes	10
Activity level	
No limitation of activity	0
Occasional limitation of activity	5
Severe restricted activity	10

Sum of PUCAI = 0-85.

obtained from a patient's history, without need for a subjective abdominal exam, invasive blood testing, or endoscopy [2]. To date, the PUCAI score has been primarily used within the gastroenterology literature to characterize disease activity and the effects of medical treatment [3–9]. The primary purpose of this study was to retrospectively investigate the relationship between pre-operative PUCAI and operative management.

Tacrolimus is a calcineurin inhibiting immunosuppressant currently used to induce remission in patients with steroid-refractory UC. Although useful as induction therapy, potential toxicities preclude its use for long-term treatment. Furthermore, many patients experience exacerbations upon transitioning from tacrolimus to maintenance therapy [7]. Given its utility for inducing remission and the subsequent difficulty in weaning patients to maintenance therapies, tacrolimus has been used most appropriately as a “bridge” agent to surgical management [7,10]. The secondary focus of this study was to evaluate the cohort of patients receiving tacrolimus therapy to determine its effect on disease activity and subsequent surgical management.

1. Methods

A retrospective review from January 2006 through January 2011 was performed identifying all UC patients at

our academic institution undergoing restorative proctocolectomy with rectal mucosectomy and ileal pouch-anal anastomosis (IPAA). Patients undergoing this operation for a diagnosis other than ulcerative colitis and patients older than 21 years of age at the time of first operation were excluded. The disease activity within one month of the first surgical procedure was calculated using the Pediatric Ulcerative Colitis Activity Index [2]. The subset of patients receiving tacrolimus within 3 months of their first operative intervention was specifically identified. Their PUCAI score was also determined at the time of initiation of tacrolimus. PUCAI scores were either previously calculated by the gastroenterology team, or retrospectively calculated from the pre-operative medical record. Given the simplicity of the activity index, this was easily done without any significant gaps in data. Surgical decisions were made without knowledge of these scores. Approval for this review was obtained from the Children's Hospital Boston IRB under protocol M11-01-0010.

1.1. Surgical technique

The decision to proceed with operative intervention was made by consensus of the patient, the patient's family, the gastroenterologists, and the surgeons. All operations were performed by the same 3 surgeons (CWL, BCL, and RCS). Preferably, a combined abdominoperineal approach was used with the ileo-anal pull-through occurring in the same operation as the laparoscopic total abdominal colectomy. If the status of the rectal mucosa or overall medical condition were judged unsatisfactory at the time of the first procedure, total abdominal colectomy alone was performed as the initial operation. The rectal mucosa was deemed unacceptable if deep ulceration into or through the submucosa was visualized on preoperative or intraoperative colonoscopy. At a later date, when conditions had improved, a staged completion proctocolectomy with rectal mucosectomy and creation of an ileal J-pouch with a hand-sewn IPAA was performed. A temporary diverting ileostomy was used in all patients in order to protect the IPAA. Following a contrast enema 6 weeks post-operatively to ensure satisfactory healing of the IPAA, the final procedure involved closure of the ileostomy.

1.2. Tacrolimus treatment

Tacrolimus therapy was initiated by the gastroenterologists for patients with severe colitis exacerbation refractory to intravenous steroids. Tacrolimus was dosed in the standard manner, as outlined in previous publications from our institution [7,11,12]. Briefly, patients received an initial oral dosage of 0.1 mg/kg/dose twice daily. Trough levels were obtained after the third or fourth dose, and dosage was adjusted to maintain a trough level of 10–15 ng/mL during induction. Once patients were noted to be responding or in remission, dosages were reduced to maintain a trough level

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