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# Outpatient curettage and electrocautery as an alternative to primary surgical closure for pediatric gastrocutaneous fistulae



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## ABSTRACT

**Background:** The development of a gastrocutaneous fistula (GCF) after gastrostomy tube removal is a frequent complication that occurs 5%-45% of the time. Conservative therapy with chemical cauterization is frequently unsuccessful, and surgical GCF repair with open primary layered closure of the gastrostomy is often required. We describe an alternative approach of GCF closure that is an outpatient, less invasive procedure that allows patients to avoid the comorbidities of general endotracheal anesthesia and intraabdominal surgery.

**Methods:** This is an Institutional Review Board approved retrospective review of all patients who underwent GCF closure from January 2010 to July 2016 at a tertiary care children's hospital. Demographics including age, weight, body mass index, comorbidities, and initial indication for gastrostomy tube were recorded. Operative details such as ASA score, operative duration, type of anesthesia, and airway were noted. Based on surgeon preference, two types of operative closure were used during that time frame: primary layered closure or curettage and cautery (C&C). The latter is a procedure in which the fistula tract is first scraped with a fine curette, and then the fistula opening and tract are cauterized circumferentially. Finally, the presence of a persistent fistula and the need for formal reoperation were determined.

**Results:** Sixty-five unique patients requiring GCF closure were identified. Of those, 44 patients (67.6%) underwent primary closure and 21 patients (32.3%) underwent C&C. The success rate of primary closure was 97% with one patient experiencing wound breakdown with persistent fistula. The overall success rate of C&C was 66.7% (14/21). Among those 14 patients, 11 (52.4%) GCF patients were closed by 1 mo. An additional two patients'

All authors have made substantial contribution to this article.

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gastrocutaneous fistulae were closed by 4 mo (61.9%). One GCF was successfully closed with a second C&C procedure. Seven of the 21 patients (33.3%) required subsequent formal layered surgical closure. C&C had significantly shorter operative times ( $13.5 \pm 14.7$  min versus  $93.4 \pm 61.8$ ,  $P < 0.0001$ ) and significantly shorter times in the postanesthesia care unit ( $101.8 \pm 42.4$  min versus  $147 \pm 86$ ,  $P < 0.0001$ ). Patients were intubated with an endotracheal tube 88.6% of the time for primary closure and 23.8% of the time for C&C. Among patients admitted for an elective procedure, the average length of stay for primary closure was 1.9 d as compared to 0 d for the C&C group. Among patients who underwent C&C with a persistent fistula, there were no significant differences in time since initial creation of gastrostomy, age, body mass index, or ASA score.

**Conclusions:** Our study verifies that primary closure remains the gold standard for persistent GCF. However, C&C is a safe, outpatient procedure that effectively treats a GCF the majority of the time in children. We suggest that in select patients, it may be an appropriate initial and definitive procedure for GCF closure.

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## Introduction

Placement of a gastrostomy tube is one of the most common surgical procedures performed on children in the United States.<sup>1</sup> Placement and maintenance of a gastrostomy tube has a wide range of complications, with major complications reportedly occurring 2%-9% of the time and minor complications occurring 2%-60% of the time.<sup>2-5</sup> One such complication is the persistence of a gastrocutaneous fistula (GCF) after removal of a gastrostomy tube; this occurs in 5% to 45% of pediatric patients.<sup>6-11</sup> Conservative therapy with chemical cauterization of the tract with silver nitrate, reduction of acidic reflux with proton-pump inhibitors, and the use of prokinetic agents to promote rapid gastric emptying are frequently attempted with varying degrees of success.<sup>12-14</sup> GCFs with a large orifice and those that persist despite attempts at conservative treatment often require operative repair.

Several studies have investigated factors likely to contribute to the development of a persistent GCF. Although one group found associations between the persistence of a GCF and method of placement, age at placement, and concurrent antireflux procedures,<sup>15</sup> the clear majority of articles have only identified the time lapse between tube placement and tube removal as a factor predisposing to the development of a GCF. As expected, gastrostomy tubes that were in place for longer were found to be more likely to develop into persistent gastrocutaneous fistulae.<sup>7-11</sup>

A recent study by Cameron *et al.*<sup>16</sup> identified gastrostomy tube placement as a prime target for quality improvement; it was among five procedures that, in sum, accounted for most procedure-associated cost variability between hospitals. Because the factor that appears to contribute most to the persistence of a GCF, the length of time for which gastrostomy is required, is minimally amenable to change, investigation into treatment options for persistent gastrocutaneous fistulae is a worthwhile endeavor. Standard treatment of a persistent GCF is surgical repair with a minilaparotomy with tract excision, primary layered repair of the gastrostomy, and closure of the abdominal wall. We describe our experience with an alternative approach of GCF closure; an outpatient, less invasive procedure that, when

successful, allows patients to avoid an inpatient hospitalization and intraabdominal surgery. The procedure, anecdotally described to one of the authors, S.S., by Dr W Hardy Hendren, but not described in the pediatric surgery literature, involves simple curettage and cautery (C&C) of the fistula track. We hypothesized that C&C is a safe and effective method for GCF closure and may be a viable alternative to standard open repair.

## Methods

After institutional review board approval, the records of all children ( $n = 65$ ) undergoing GCF closure at our tertiary care children's hospital from January 2010 to July 2016 were identified by International Classification of Disease, Tenth Edition and Current Procedural Terminology codes (43,870, K31.6) and retrospectively analyzed. A waiver of informed consent was obtained. During this time frame, two types of operative closure were used based on attending surgeon preference: primary layered closure or C&C.

Although slight variations in technique exist for each individual surgeon, the major steps of a primary layered closure are as follows: an elliptical incision is made in the skin and soft tissue encompassing the GCF opening, electrocautery is used to deepen the incision, the abdominal cavity is entered, and the stomach is freed circumferentially from the anterior abdominal wall. Stay sutures are placed on either side of the gastrostomy. The GCF tract is resected and sent for pathologic examination. The gastrostomy is closed with either layered suture repair or a stapler. The stomach is returned to the abdomen. The fascia is mobilized then closed. The overlying subcutaneous tissue and skin are closed in layers. C&C is a procedure in which the fistula tract is first scraped with a fine curette, and then the fistula opening and tract are cauterized circumferentially.

All pediatric patients, inclusive of patients aged 18 y, were included in the analysis. Patients aged 19 y or older were excluded. Demographics including age, weight, BMI, comorbidities, and initial indication for gastrostomy tube were collected. Operative details such as ASA score, operative duration, type of anesthesia and airway were recorded.

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