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Supraumbilical pyloromyotomy: a unique indication for antimicrobial prophylaxis

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Abstract

Background: The umbilical fold incision for infantile hypertrophic pyloric stenosis provides a convenient exposure and cosmetically appealing scar. This study investigates the possible difference in infection rates between traditional and supraumbilical approaches for pyloromyotomy.

Methods: All patients who underwent pyloromyotomy for infantile hypertrophic pyloric stenosis at a tertiary pediatric hospital were reviewed. Baseline wound infection rate was determined through review of patients with right upper quadrant incisions (group 1). A nonrandomized comparison was performed between patients with a supraumbilical approach (group 2) and those undergoing supraumbilical incisions after prophylactic antibiotic administration (group 3).

Results: Complete records were reviewed on 384 patients over a 6-year period. Demographics and preoperative factors were similar among groups. The rate of infection in group 1 (n = 258) was 2.3%. With introduction of the supraumbilical approach, there was a statistically significant increase in wound infection rate to 7.0% (χ^2; group 1 vs group 2, $P < .05$). The use of prophylactic antibiotics with a supraumbilical approach reduced this rate of infection back to 2.3% (χ^2; group 1 vs group 3, $P < 1.0$ and group 2 [n = 85] vs group 3 [n = 42], $P < .3$).

Conclusions: The risk of wound infection by classic pyloromyotomy of 2.3% is significantly increased with an open supraumbilical approach. The use of prophylactic antibiotics reduces this risk of wound infection.

Since its first description by Ramstedt [1] in 1912, the standard operation for infantile hypertrophic pyloric stenosis (IHPS) has been a pyloromyotomy through a right upper quadrant (RUQ) incision. In 1986, Tan and Bianchi [2] demonstrated that a supraumbilical approach could also be used with success. The umbilical fold incision provides a convenient exposure of the pylorus and results in a cosmetically appealing scar. Conflicting evidence is present in the literature concerning the possible increased rate of wound infection with this newer approach when compared with the classic RUQ incision [2-7]. At our institution, the use of a supraumbilical incision was accompanied by a

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perceived increase in wound infections as compared with the traditional RUQ incision. In response to this, the role of antibiotic prophylaxis for patients undergoing a supraumbilical approach was investigated. The goals of this study were to ascertain the incidence of wound infection for the classic RUQ incision approach, to assess the effects of the supraumbilical incision on wound infection rates, and to determine whether prophylactic antibiotics are indicated for pyloromyotomy via a supraumbilical incision.

1. Methods

All patients undergoing pyloromyotomy for IHPS at a tertiary pediatric hospital over a 6-year period from January 1997 through December 2002 were retrospectively identified through search of the hospital admission database by International Classification of Diseases, Ninth Revision, diagnosis code 750.5. Authorization was obtained before initiation of this study through institutional review board approval under study 0608-68. Patient demographics (sex, gestational age, and age at presentation), preoperative status (duration of emesis, bicarbonate [HCO_3^-] level, and weight), operative conditions (incision site and antibiotic administration), and postoperative outcomes (length of hospitalization and wound infection) were analyzed. Operative approach and antibiotic administration were at the discretion of the attending surgeon. Antimicrobial prophylaxis consisted of a first-generation cephalosporin (25 mg/kg) administered at the time of incision.

The baseline rate of wound infection was determined through review of patients with classic RUQ incisions who did not receive antimicrobial prophylaxis (group 1). A nonrandomized comparison was then performed between patients with a supraumbilical approach (group 2) and those with a supraumbilical incision after prophylactic antibiotic administration (group 3). Statistical analysis was performed using χ^2 analysis of ordinal data and Student's t test of nominal data where appropriate. A P value of <.05 was considered statistically significant.

2. Results

Four hundred thirty-seven patients were identified as having undergone pyloromyotomy for IHPS over the 6-year study period. Thirty-two patients who received prophylactic antibiotics for an RUQ approach were excluded from the study. An additional 21 patients had incomplete data on placement of the incision and were also excluded from analysis. Three hundred eighty-four patients are the basis of the study. Patient demographics and presenting characteristics are summarized in Table 1. Overall male-female ratio was maintained among groups 1, 2, and 3 (5.0:1, 8.2:1, and 4.2:1, respectively). A statistically significant difference was noted only by univariate analysis among the proportion of males in group 2 vs group 3 ($P < .03$). One hundred seventy-three patients had protracted emesis, defined as emesis more than 5 days. Protracted emesis occurred in 111 (42.1%), 40 (46.5%), and 22 (52.3%) patients in groups 1, 2, and 3, respectively. There were no significant differences among the groups' preoperative status as determined by duration of emesis or degree of metabolic alkalosis. Overall average length of hospital stay was 53.1 hours. Average stay was 54.4 hours, 48.1 hours, and 51.0 hours in groups 1, 2, and 3, respectively. Overall, there was no significant differences among the groups.

There were a total of 13 wound infections that were identified by the presence of wound cellulitis, abscess formation, or disruption of the incision with abscess drainage. The baseline rate of infection as determined by the rate of infection in group 1 was 2.3% (6/257). With introduction of the supraumbilical approach, there was a statistically significant increase in the wound infection rate to 7.0% (χ^2; group 1 vs group 2, $P < 0.05$). The use of prophylactic antibiotics with a supraumbilical approach in group 3 obtained a rate of wound infection equivalent to that of group 1 of 2.3% (χ^2; group 1 vs group 3, $P < 1.0$ and group 2 vs group 3, $P < .3$). This is a decrease of 67% in the rate of wound infection. There were no incidental duodenotomies in any of the patients studied.

Table 1 Patient demographics and perioperative characteristics

	RUQ	Supraumbilical	Supraumbilical + antibiotic	Overall
Total	257	85	42	384
Male	206	74	34	314
Female	41	9	8	58
Age at presentation (d)	37.2	35.7	37.8	36.7
Gestational age (wk)	38.5	38.5	38	38.3
Duration of emesis (d)	8.9	8.7	9.7	9.0
HCO_3^- (mEq/L)	25.8	26.8	25.7	26.0
HCO_3^- >30	37	18	6	61
Time to first feed (h)	8.3	8.7	9.0	9.4
Wound infections	6	6	1	13