

# Can Patient Factors Predict Early Discharge After Pyloromyotomy?

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## Abstract

**Background:** Because of increased pressure to shorten hospital stays, some advocate discharging patients with pyloric stenosis within four hours of pyloromyotomy. Because some patients have persistent emesis after pyloromyotomy and thus require prolonged hospitalization to prevent dehydration, it would be helpful to be able to predict in which patients this will occur.

**Methods:** We conducted a retrospective review of pyloromyotomies performed within a six-year period to determine whether patient factors could predict length of hospitalization in patients with pyloric stenosis. The study outcome was time to discharge after pyloromyotomy, and the independent variables were patient's age, patient's weight, symptom duration, duration of preoperative hydration, and pyloric length and thickness. Patients were grouped on the basis of time of discharge after pyloromyotomy: <24, 24 to 48, and >48 hours.

**Results:** Of 230 patients, 58% were discharged within 24 hours, 31% between 24 and 48 hours, and 11% after 48 hours. Patients' weight was inversely proportional to the postoperative length of hospitalization. Conversely, length of time required for preoperative hydration was directly proportional to the duration of postoperative hospitalization.

**Conclusions:** Patients with lower weight and a longer preoperative hydration period had an increased risk of prolonged hospitalization after pyloromyotomy.

## Introduction

Hypertrophic pyloric stenosis is a common condition treated by pediatricians, family-medicine specialists, and pediatric surgeons. In general, within 24 hours after pyloromyotomy, most patients tolerate full feedings

and are discharged. Despite different feeding regimens and the recent adoption of a minimally invasive approach, this duration for postoperative stay remains relatively unchanged.<sup>1-6</sup> In the current environment of rising health care costs and shorter hospitalizations, some advocate discharging patients three or four hours after pyloromyotomy, with resumption of feeding at home. However, some patients have persistent emesis after the procedure and thus require a prolonged hospital stay to prevent dehydration. Currently, there is no way to predict which patients can tolerate early discharge and which will require a longer hospital stay. Thus, we conducted a study to determine whether patient factors could predict length of hospitalization in this population.

## Methods

After obtaining the approval of our institutional review board, we conducted a retrospective review of all cases involving patients who underwent pyloromyotomy for hypertrophic pyloric stenosis during a six-year period. The study outcome was time to discharge after pyloromyotomy, and the independent variables were patient's age, patient's weight, symptom duration, duration of preoperative hydration, and pyloric length and thickness. Patients were grouped on the basis of time of discharge after pyloromyotomy: within 24 hours, 24 to 48 hours, and after 48 hours. Statistical analysis was performed using analysis of variance, with post hoc Bonferroni adjustment for pairwise comparisons.

## Results

Of the total of 230 patients (21% of whom were girls) identified for this study, 51 underwent laparoscopic pyloromyotomy and 179 underwent open pyloromyotomy. Results are detailed in Table 1. Fifty-eight percent of patients were discharged within 24 hours, 31% at a point between 24 and 48 hours, and 11% after 48

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<b>Table 1. Effects of age, weight, symptom duration, duration of preoperative hydration, and pylorus size on duration of hospitalization after pyloromyotomy</b>				
Variable	Duration of postoperative hospitalization			p value
	<24 hours (n = 133)	24–48 hours (n = 71)	>48 hours (n = 26)	
Age (weeks)	5.3 ± 2.7	5.0 ± 2.4	5.7 ± 5.6	0.74
Weight (kg)	4.2 ± 0.8	4.0 ± 0.8	3.6 ± 1.1	<0.0001
Duration of symptoms (days)	8.1 ± 7.0	8.0 ± 7.5	7.9 ± 7.5	0.92
Duration of preoperative hydration (days)	0.7 ± 0.8	0.8 ± 1.0	1.1 ± 1.0	0.03
Pyloric length (mm)	19.8 ± 3.1	19.5 ± 3.1	19.6 ± 2.6	0.97
Pyloric width (mm)	4.9 ± 0.8	4.8 ± 0.8	4.6 ± 0.7	0.07

hours. Patients' weight was inversely proportional to the postoperative length of hospitalization. Conversely, the amount of time required for preoperative hydration was directly proportional to the duration of postoperative hospitalization.

## Discussion

It would be useful to predict which patients can tolerate feedings and discharge early after pyloromyotomy and which patients cannot, so as to benefit from the significant cost savings and improved use of hospital beds that result from early discharge and yet prevent Emergency Department visits and readmission for some patients and anxiety for their parents. Previous studies have shown little change in the time to discharge on the basis of feeding regimen. Early feeding (less than four hours) after pyloromyotomy did not decrease the time to full feedings or the duration of postoperative hospitalization.<sup>1</sup> Furthermore, ad libitum feedings also had little effect on time to full feedings and to discharge.<sup>2,3</sup>

The most recent change in the treatment of pyloromyotomy has been the adoption of laparoscopic pyloromyotomy. A recent multi-institution, prospective, randomized trial by Hall et al<sup>4</sup> showed that the time to both full feedings and discharge was reduced by 10 hours with the laparoscopic technique. However, in that study, the time to full feedings was still 18.5 hours and the duration of hospitalization after surgery was 33.6 hours. Furthermore, two other prospective studies showed that the time to full feedings and the time to discharge were similar between the laparoscopic and open techniques.<sup>5,6</sup> Predicting early discharge on the basis of the pyloromyotomy technique is thus not feasible.

Because those earlier studies found no effect from factors not associated with the patients themselves, we sought correlations between patient-specific factors and length of hospital stay. We found that the patient's age had no effect but that the patient's weight was inversely proportional to the duration of postoperative hospital-

ization. This finding confirms our anecdotal observation that smaller children tend to require a longer recovery period. However, the mean weight of the patients with a short postoperative course (<24 hours) was 4.2 kg versus 3.6 kg for patients requiring a prolonged hospital stay (>48 hours). Thus, the weight difference between these two groups was only 0.6 kg, making the clinical significance of this finding questionable. Furthermore, we do not currently support the use of a threshold weight of 4 kg to determine whether patients should be discharged after a four-hour observation period. However, in view of these data, this aspect may be a good starting point for designing a prospective study.

Unlike our anecdotal observation that smaller infants required a prolonged recovery, this was not true for symptom duration. We had also believed that patients with a delayed diagnosis also required a longer postoperative course. Yet in our study, we found that symptom duration and pylorus size had no effect on postoperative length of stay. However, we did find that the duration of preoperative hydration was directly correlated to duration of postoperative hospitalization. This finding suggests that the severity of dehydration is a more important factor than symptom duration with respect to the postoperative recovery period. Again, we are not advocating early discharge in patients with a short rehydration period, but we believe that this information is helpful in planning a prospective study to validate or refute this finding.

Our study had multiple limitations. First, it was a retrospective study. Several different surgeons performed the pyloromyotomies, and the specific technique used was based on each surgeon's preference. During the study period, the minimally invasive approach had just begun to be implemented, accounting for the low number of laparoscopic pyloromyotomies. However, we do not believe that the use of different techniques had a major effect on recovery, as shown by multiple previous studies.<sup>5-7</sup> Another limitation of our study was

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that the postoperative feeding regimen was not standardized. Again, we do not believe that this had a major impact on postoperative length of stay, as shown by previous studies.<sup>1-3</sup> Furthermore, the discharge criterion was fairly standard: Patients had to be tolerating full feedings before discharge. Finally, only slightly more than half of the patients in our study were discharged within 24 hours. This group of patients would most likely be the best candidates for early discharge (after a four-hour observation period), with resumption of feedings at home. We found that this group of patients had a higher weight and shorter length of preoperative hydration than the other groups. Because these differences were small, at this time we believe that until a prospective study confirms these findings, patients should remain hospitalized until they tolerate full feedings after pyloromyotomy. We are now designing just such a prospective study. ❖

#### Disclosure Statement

*The author(s) have no conflicts of interest to disclose.*

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## Attending to the Nature and Constitution

Medicine is an art, and attends to the nature and constitution of the patient, and has principles of action and reason in each case.

— Gorgias, *Plato*, c427-347 BCE, *Greek philosopher and educator*