Original Research Article

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Pre-operative nutritional status affects enteral feeding in post-operative period among pediatric laparotomy cases

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ABSTRACT

Background: Early introduction of enteral feed in postoperative settings, although advocated, is not practiced universally. This study reviews post-operative feeding practices amongst pediatric surgery cases and variables affecting it.

Methods: A retrospective analysis was done for children operated for abdominal conditions during 2013-2015. Data were analyzed for pre-operative variables, operative indications and procedure, post-operative events and feeding practices.

Results: Seventy children underwent laparotomy during study period. Median time of starting enteral nutrition was 3rd post-operative day and full feed attainment was day 6. Severely thin/malnourished children could be started on enteral feed on 3.89+1.76 days while normal nourished children were started on 2.2+0.87 days (p<0.05). Eleven cases noted interruption of feed, regurgitation was the commonest cause. Cases of abdominal Koch's and cases requiring gut incision showed delay in feed onset.

Conclusions: Post-operative onset of enteral feed and tolerance depends on pre-surgery nourishment status, baseline disease condition and type of surgery.

Keywords: Abdominal surgery, Feeding, Malnourished, Post-operative nutrition

INTRODUCTION

Nutrition has significant impact on health and well-being. Many ailments of pediatric age group are directly related to poor nutrition and impairment of nutrition prolongs ailments of almost all type. A recovery is delayed in poorly nourished child. Effect of nutrition on disease and recovery has been studied but factors causing difficulties in peri-illness nutrition is not addressed fully. Surgical procedure involving abdominal cavity of children is often having a period of fasting and slow introduction of feed. Guideline advocates starting enteral feed as early as within 24 hours for non-critically ill abdominal surgery cases. Even for surgical procedures involving gut

manipulation has been advised for the same. However, adherence to this in practice is lacking.² While from healing of wound to regaining pre-surgical state of wellness has been linked to pre-surgical nutrition status, effects of nutrition on post-operative feed tolerance has not been answered. Moreover, data about pediatric cases are limited and extrapolation of adult population data lacks scientific backup. Himalayan Hospital is a tertiary care referral center and caters cases from all types of economic strata. Despite awareness and eagerness to implement early enteral feeding in post-operative period, unavoidable delay has been observed. This study was planned to note the trend of nutritional practices among pediatric abdominal surgery cases during immediate post-

operative period. Study aims to find out factors affecting enteral feeding practices as well.

METHODS

This study was conducted in Department of Pediatric Surgery and Pediatric critical care of Himalayan Hospital; Swami Rama Himalayan University, Dehradun, India. This was a retrospective study. Individual consent from patient or parents was not feasible due to retrospective nature of analysis. A prior ethical clearance was obtained from institutional research committee (SRHU/HIMS/RC/2017/478).

This study involved data collections of pediatric patients undergoing abdominal surgeries during year 2013-2015. Inclusion was made for all operative procedures requiring laparotomy in age group of less than 18 years. Cases operated for biopsy purpose were excluded. Cases operated at another center and subsequently referred to pediatric intensive care were also excluded. Data was collected form digital storage [Hospital Information System] as well as from physical file stored at medical record department.

Data were collected for demographic profile, weight and body mass index, diagnosis, surgery and its complications, feeding practice in post-operative period and morbidities during stay. Nutritional status was calculated based on weight for age for birth to five years age group and body mass index for 5-18 years group. Parameters were calculated in reference to Indian Academy of Pediatrics [IAP] body mass index chart for >5 years age and IAP malnutrition classification chart based on weight for age percentage. 3.4 Data was analyzed for feeding practices, starting time, attainment of full feed, intolerance issues and correlation of other variables with feeding. Median, standard deviation of variable was calculated using SPSS software (IBM corp. Release 2012, IBM SPSS statistics for windows, version 21.0. Armonk, NY. IBM corp.)

RESULTS

A data of total 70 cases were retrieved who were operated for abdominal conditions during this period. Out of which 28 were infants with median age of 2 months and male predominance (22:6). Median age of non-infantile age was 11.5 years. A less predominant male dominance was noted in this group as well (23:19). Five cases were admitted twice for second scheduled surgery. Total of 70 surgeries performed on 65 cases.

The most common indication of surgery was perforation. Intestinal perforation was noted in 13 cases while appendicular perforation was noted in 5 cases. Intestinal obstruction was present in 8 cases. Infantile age group showed majority of admissions with congenital anatomical defect. Anomaly like atresia, malrotation, malformations and cysts were noted in 16 cases while 6

infants showed intussusception. Other diagnosis were not so common (Table 1).

Table 1: Operative indications.

Operative diagnosis	Infantile age group (n)	Children >1 year of age (n)
Intestinal atresia	4	
Gut malrotation/volvulus	4	4
Koch's abdomen		9
Intestinal obstruction (not associated with Koch's/malrotation)	1	7
Trauma		5
Duplication cyst/ Tumor/Ovarian Cyst	8	
Intussusception	6	5
Intestinal perforation (non-traumatic)	1	12
Hirschsprung's disease	2	
Ano-rectal malformation	2	
Total	28	42

Meckels diverticulum was noted amongst 7 cases operated for another reason. Abdominal Koch's was noted among 9 cases out of which 4 required re surgery later. Sexual violence and related traumatic injury required surgery (colostomy and repair) in one case. Same case required revision surgery after 6 months (colostomy closure).

Table 2: Feeding variation with pre-operative nutrition status.

Nutritional status (n)	Days of feed start (Median±SD)	Days of attaining full enteral feed (Median±SD)
Low birth weight (4)	4.6±2.8	10±2.1
Normal weight/BMI group (32)	2.2±0.87	4.6±3.1
Mild/moderate malnourished, thin (11)	3±1.18	6.4±2.9
Severe/ very severe malnourished, severely thin (19)	3.89±1.76	7.8±4.5

Surgical complications were noted among 16 cases. Nine cases required re suturing in view of suture gaping or discharge from suture site. Two cases of burst abdomen were noted. Intestinal obstruction was noted in 2 cases at day 3 and day 5 post-operative days respectively and required re exploration. Total 7 cases required re-exploration. Sepsis was present among 5 cases before surgery. However, in post op period, 3 cases developed sepsis, 2 with *klebsiella* growth. Abdominal distension

was noted among 2 cases, both managed conservatively. No definite cause was found.

Feed was attempted on day 1 post-operative as per policy unless child was sick/ febrile. Stoppage of gastric aspirates, present bowel sound, and hemodynamic stability were factors considered before starting feed at study center. The median time of starting feed was 3rd post op day. Five cases were started on feed beyond day 10 post operative. Full feed was established at median time of post operative day 6. Eleven cases noted interruption of feed due to various reasons. Most common reason was distension and regurgitation of feed. Among 9 cases, re introduction was successful however two cases developed severe sepsis. Both of them died later before the re-introduction of feed.

Among infants, 13 were neonates and 9 were preterm. The median time of presentation to surgery unit was day 18 of life. Amongst all beyond neonatal period, 68% (38/57) cases were malnourished at admission Feeding start was delayed and tolerance was poor in these patients in comparison to nourished children. Median time of starting feed among severely thin/ severe malnourished child was 3.89±1.76 days while that of normal nourished child was 2.2±0.87 days (p value <0.05). Delay of starting feed in mild/ moderate malnourished children was comparable to thin/severely malnourished children (Table 2). Complications were noted more in this subset compounding delay in attaining full feed.

DISCUSSION

Pediatric population is different from adult counterpart on basis of ailments, physiology, recovery potential and nutritional demands. Abdominal surgery (surgery requiring laparotomy) invariably warrants a brief period of cessation of enteral nutrition. While some ailments like intestinal perforation or gangrene requires prolonged period of fasting even in pre-op period, other spectrum of disease like intussusception and malrotation gets easy start on feeding. Often these children are already compromised nutritionally due to disease. Starting a feeding in post-operative period often takes back seat while operative procedure, dressing, injectable analgesics and antibiotics take priority.

Study noted median time of starting feed as 3 days. Even for surgeries causing gut resection/handling, an early feed has been advocated.⁵ Meta-analysis has shown clear benefit of starting early enteral feed in term of reduced post-operative complications. Early feeding attempts have not been associated with any bowel or flatus delay, prolonged stay or morbidity.⁶ For major gynecological abdominal surgeries, recommendation of early start of feed has been made based on significant reduction in stay duration and morbidities.⁷ Although present study noted attempt of starting feed on day 1 also among 29 cases, 11 cases showed poor tolerance in form of regurgitation or abdominal distension. A direct comparison from adult

population is hard to do. Moreover, tolerance of feed also depends on pre-surgery morbidity and surgical extent.

Indian population catered in study center was of low to very low socio-economic class. Pre-operative nutritional status measured by weight for age showed 45% in moderate malnutrition, and 23% of infants were low birth weight. Assessment by Indian population-based scale seems more useful in defining nutritional status. Effect of this pre-existing nutritional morbidity on feed tolerance is less reviewed and analyzed. This study found a correlation between low weight for age and feed tolerance, feed start, prolonged stay and complications. Previous studies found correlation between feeding time and hospital stay and morbidities. However, mention of pre-operative morbidities and nutritional status were lacking.^{8,9} Effect of these variables cannot be negated.¹⁰ Probably in these studies also, a poorly nourished patient was more prone to experience delay in feed start and subsequent complications. In present study also, early start of feed in under nourished children got interruption due to poor tolerance. Pre-surgery nutrition status is strongly associated with fast recovery. Hemoglobin (Hb) level at admission was not affecting feeding practices. However, Hb <8gm%, were invariable transfused before surgery. Analysis of surgeries requiring gut incision showed delayed feeding start and more interruption in comparison to abdominal surgeries not involving gut incision. Under nourished children often became fit for feed by day 2 or 3. Abdominal Koch's cases were found to have significant mal nourishment at surgery and poor feed tolerance in post-operative period.

Study noted interesting feeding pattern and tolerance of pediatric surgery cases operated for abdominal ailments. A delay in feeding was noted in general due to patient poor pre-operative condition and also due to poor importance to nutrition given by surgery team. There is a need for nutrition related awareness in surgeon as well as family. This study concludes that pre-operative nutritional status is an important factor affecting feeding practice and feed tolerance in post-operative period. Neglect for pre-operative morbidity factors in deciding post-operative feeding guideline should be addressed by a larger pooled data or trial

CONCLUSION

Post-operative onset of enteral feed and tolerance depends on pre-surgery nourishment status, baseline disease condition and type of surgery.

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