



Original Article

EVALUATION OF POSTOPERATIVE WOUND INFECTION IN CHILDREN

MAJUMDER PS¹, KARMAKER A², ALAM MM³, NESSA L⁴

Abstract

Wound infection and wound related complications are common causes of lengthening of hospital stay. This study was conducted to assess postoperative wound infection in children. It was also decided to estimate the rate of wound infection in children and to identify the factor that best predicts postoperative wound infection in children. This prospective study was carried out in the Department of Paediatric Surgery, BSMMU, Dhaka during the period of January 2009 to September 2010 and included consecutive 100 children undergoing routine surgery. The children were assessed during the first 30 postoperative days for the evidence of wound infection that were confirmed by culture and sensitivity.

This study shows majority of the children were found in the age group of 13 – 60 months in both groups. The mean (\pm SD) age was 67.74 \pm 58.25 months with ranged from 13 months to 180 months. It was found that majority were male (73%). The post operative wound infection was 16% and the status of wound infection according to nature of wound was assessed and found that 7(43.8%) were clean and 9(56.2%) were potentially contaminated among the children who had wound infection. However, 65(77.4%) and 19(22.6%) were clean and potentially contaminated respectively among the children who didn't had any wound infection. The status of wound infection according to BMI was assessed and found that BMI <20 kg/m² in 15(93.8%) children who had wound infection and in 61(72.6%) of the children who didn't had any wound infection. BMI 20 – 25 kg/m² was in 1(6.2%) child who had

wound infection and in 23(27.4%) of children who had no wound infection. The status of wound infection according to serum albumin was assessed and found that serum albumin <35 gm/L was in 14(87.5%) of the children who had wound infection and 4(4.8%) of the children who didn't had any wound infection. Serum albumin level \geq 35 gm/L in 2(12.5%) of children who had wound infection and in 80(95.2%) of the children who had no wound infection. An increased rate of wound infection was associated with operative procedures longer than 1 hour and with the presence of an associated illness. It could be concluded that the greatest risk factors were those associated with local contamination of the surgical wound.

Introduction

Wound infections are common, serious and expensive complications after surgery and in Paediatric Surgical practice wound infection is still a major concern in developing countries like Bangladesh. Wound infection may result from many predisposing factors¹ and there is evidence that malnutrition is an important predisposing factor. It is found that malnutrition influence wound healing and the incidence of postoperative surgical-wound infection.² It is also found that malnutrition is associated with an increased incidence of nosocomial infection.³ Moreover, protein depletion has been correlated with sepsis, pneumonia and other infections particularly wound infection.⁴ There is evidence that protein malnutrition is responsible for increased mortality and postoperative morbidity that includes impaired healing and increased rate of wound infection.⁵ It has been estimated that nearly 50.6 million under-five children are malnourished and almost 90% of these children are from developing countries (Faruque et al. 2008)⁶ According to the State of the World's Children (SOWC) report 2008, issued by the United Nations Children's Fund

1. Dr. Partha Sarathy Majumder, Assistant Professor, Paediatric Surgery, Abdul Malek Ukil Medical College, Noakhali.
2. Dr. Anuradha Karmaker, Registrar, Gynae & Obs, Anwar Khan Modern Medical College, Dhanmondi, Dhaka.
3. Dr. Md. Mahbul Alam, Registrar, Paediatric Surgery, Dhaka Medical College, Dhaka.
4. Dr. Luffan Nessa, Assistant Professor, Paediatrics, Abdul Malek Ukil Medical College, Noakhali.

Address to correspondence: Dr. Partha Sarathy Majumder, Assistant Professor, Paediatric Surgery Abdul Malek Ukil Medical College, Noakhali, Mobile- 01712196254, E-mail: parthafcps@gmail.com

(UNICEF), eight million or 48% of all under five children of Bangladesh are underweight⁷ and according to UNICEF report 2009, Bangladesh has one of the highest child malnutrition rates in South Asia with a little fewer than 1 in 2 children being moderately or severely underweight and it is conceivable that as much hospitalized children are malnourished.⁷

The nutritional status of patients can be assessed by a variety of methods. At present, there is no universally accepted gold standard for defining patients with malnutrition or at risk of malnutrition.⁸ The clinical parameters most commonly used to assess the nutritional status of surgical patients are the serum albumin, total lymphocyte count, haemoglobin and body mass index (BMI, kg/m²). These are practical and reproducible tests that are available in most surgical patients, even in our setting. Serum albumin less than 3.5 gm/dl and total lymphocyte count less than 1500/mm³ are considered to represent clinical malnutrition.⁹ According to the European e-journal of clinical nutrition and metabolism (ESPEN) guidelines for nutrition screening, the normal BMI range is defined as 20-25 kg/m², moderately malnourished as 18.5 – 20 kg/m², severely malnourished as less than 18.5 kg/m² and a BMI of more than 25 kg/m² is defined as overweight.¹⁰ The haemoglobin is considered normal if it is > 10gm/dl.

There is no study in Bangladesh that correlates malnutrition and postoperative wound infection. Thus, keeping in mind that malnutrition is so prevalent in this country, this study is being carried out to see the incidence of wound infection in Paediatric surgical patients and to see the correlation of malnutrition and wound infection in children and to find the best indicator of malnutrition that predicts wound infection.

Methods and Materials

It was a prospective and analytical study. The study was carried out in the Department of Paediatric Surgery, Bangabandhu Sheikh Mujib Medical

University, Dhaka. The study was carried out from January 2009 to September 2010. A total 100 patients were included. Cases were selected from the admitted patients scheduled for elective surgery in the Department of Paediatric surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka. Patients were categorized according to nutritional status within 7 days before the operation. Data was processed and analyzed using computer based software, Statistical Packages for Social Science (SPSS).

Results

Table I

Demographic characteristics of patients (n=100)

Characteristics	Number	Percentage (%)
Age in months		
13 – 60	58	58
61 -120	21	21
121 -180	21	21
Mean±SD	67.74±58.25	
Sex		
Male	73	73
Female	27	27

Table II

Weight and height distribution of children (n=100)

	Mean±SD	Range
Weight in kg	21.4±25.65	4-65
Height in cm	101.95±67.95	52-175

Table III

Postoperative wound infection of the study children (n=100)

Wound infection	Number	Percentage (%)
Present	16	16
Absent	84	84

Table IV

Status of wound infection according to nature of wound (n=100)

Nature of wound	Had wound infection (n=16)		No wound infection(n=84)		P value
	n	%	n	%	
Clean	7	43.8	65	77.4	0.009 ^s
Potentially contaminated	9	56.2	19	22.6	

Table V
Status of wound infection according to BMI of the children (n=100)

BMI (kg/m ²)	Had wound infection (n=16)		No wound infection (n=84)		P value
	n	%	n	%	
<20 kg/m ²	15	93.8	61	72.6	0.006 ^s
20 - 25 kg/m ²	1	6.2	23	27.4	

Table VI
Status of wound infection according to Serum albumin of the children (n=100)

Serum albumin (gm/L)	Had wound infection (n=16)		No wound infection (n=84)		P value
	n	%	n	%	
<35 gm/L	14	87.5	4	4.8	0.001 ^s
≥35 gm/L	2	12.5	80	95.2	
Mean±SD	29.1	±4.4	41.9	±4.9	0.001 ^s
Range (min - max)	(21	-38)	(30	-50)	

Discussion

Despite improvements in antimicrobial therapy, surgical technique and postoperative intensive care, wound infection continues to be significant source of mortality and morbidity for the Paediatric patient.¹¹ There is evidence that malnutrition is an important predisposing factor of wound infection.² Bangladesh is a country with the highest rate of malnutrition.⁶ There is, however no universally accepted gold standard for defining patients with malnutrition.⁷ This study was conducted to ascertain the relation of malnutrition with wound infection; to estimate the rate of wound infection in Paediatric surgical patients and to identify the indicator of malnutrition that best predicts wound infection.

In this study, 16 patients (16%) developed wound infection postoperatively and among them 7 patients (43.8%) had clean wound and 9 patients (56.2%) had potentially contaminated wound. In two other studies of general surgical patients wound infection was found to be 16.6%¹² and 14.5% respectively.¹³ There is no similar study in Paediatric surgical patients. The factor of wound contamination was considered as a determining factor for wound infection and when compared to the rate of wound infection, there was significant positive correlation. This indicates that contamination is an important determinant of wound infection.¹⁴

In this study, BMI correlated significantly with the rate of wound infection. Patients with low BMI (<20 kg/

m²) had 5.66 times more rate of wound infection than that of patients with normal BMI (20-25 kg/m²). One study in cardiac surgical patients indicates that low BMI (<20 kg/m²) significantly influence postoperative wound infections.¹⁵ The exact mechanism of this association remains unknown but the authors speculate that patients with low BMI have lower percentage of body fat, hence less nutritional reserve, which allow them to handle microorganism less efficiently, resulting in greater rate of wound infection.¹⁵

In this study, serum albumin also had significant positive relationship with wound infection and patients with low serum albumin (<35 gm/L) had 140 times greater rate of postoperative wound infection than the patients with normal serum albumin (≥35 gm/L). It has been found earlier that hypoproteinemia is associated with an increased incidence of postoperative wound infection and serum albumin among others have the strongest association with surgical wound infection.¹⁶ Gunningberg et al. study similarly support that low preoperative serum albumin is a significant predictor for surgical wound infection.² In hip and knee arthroplasty surgery, if serum albumin was less than 35 gm/L there was 7 times more rate of surgical wound infection.¹⁷ In spinal surgery if serum albumin was less than 35 gm/L there was 15.55 times more risk to develop surgical wound infection in comparison to that in patients with normal serum albumin.¹⁸

Conclusions

The status of wound infection according to nature of wound was assessed and found that children with potentially contaminated wound had more wound infection than children with clean wound. It was also observed that lower BMI and lower serum albumin was more likely to have wound infection and serum albumin is the best predictor of postoperative wound infection. As malnourished children are more prone to wound infection we should improve nutritional status of malnourished patient before elective surgery to reduce morbidity due to wound infection and we should improve nutritional status of all children as we do not know who may require surgery in future.

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