

ORIGINAL RESEARCH

Study of prevalence of specific medical conditions revealed on routine preoperative evaluation in scheduled surgical procedure

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ABSTRACT

Background: Preoperative evaluation allows for comprehensive assessment, additional evaluation and optimization of the patient's condition without delaying surgery and has the potential to reduce the number of late operating room cancellations due to newly discovered co-morbidity. Present study was aimed to study the prevalence of specific medical conditions which were revealed on the preoperative evaluation, assess their risk for surgery and provide medical recommendations for the same.

Material and Methods: Present study was hospital based, observational study, conducted in children up to 18 years of age referred for medical evaluation prior to elective surgery.

Results: Out of 300 patients, maximum number of patients were between 2 and 5 years of age (34%) and 110 patients (36.7 %) had one or more previously undiagnosed medical condition. Previously undiagnosed medical conditions were seen to be more prevalent in the female patients (46.3%) than in male patients (33%). 72 patients (24%) had a past history of surgery, 10 patients (3.3%) had history of worms, 2 patients (0.6%) had history of pica, 1 patient (0.3%) had history of haematemesis and 1 patient (0.3%) had history of factor VIII deficiency. Out of 300 patients studied, 82 patients (27.3%) were anaemic, 18 patients (6%) had eosinophilia on differential leucocyte count, 10 patients (3.3%) had worms in stool, 8 patients (2.6%) were suspected to have thalassemia trait/minor. Majority of patients were diagnosed on the basis of clinical examination and investigation (76.3%), by routine investigations (25.4%) and on clinical examination only (20.9%). Common interventions in present study were iron and folic acid supplements (25.6%), antihelminthic medication (7.6%), steroids in the perioperative period (2.6%), advised thalassemia screening (2.6%), suggested tooth extraction (2.6%).

Conclusion: Anaemia was seen to be the most common previously undiagnosed medical condition followed by eosinophilia and the third being worms in stool.

Keywords: routine preoperative evaluation, scheduled surgery, anaemia, medical intervention.

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INTRODUCTION

Preoperative evaluation is an essential step prior to the surgical procedures. Traditionally, patients have always been visited in the ward for preoperative evaluation the day before surgery. As a result of the increasing number of patients operated in outpatient surgery or after same day admission in the past decade, the timing of preoperative evaluation has shifted from the day before surgery to outpatient preoperative evaluation (some days before surgery). It has been reported that outpatient preoperative evaluation increases the quality of care and cost-effectiveness.^{1,2}

The preoperative evaluation of infants and children, as compared with adults, is complicated by the fact that the compilation of medical information must be obtained not only from the patient directly, but also from many other sources, including parents, other caregivers, pediatricians, and neonatologists. Pediatrician should play a leading role in the medical evaluation and psychological preparation of children before surgery or other procedures requiring anaesthesia.^{2,3}

The subspecialty consultants (cardiology, pulmonary medicine, endocrinology, and so on) should be identified before the preoperative visit so that a current evaluation can be obtained and reviewed. The knowledge of the patient's past medical history and the results of an appropriate physical and/or laboratory evaluation before anesthesia and surgery can provide valuable information to both the anesthesiologist and the surgeon in making the determination as to whether the procedure should take place.^{4,5}

Preoperative evaluation allows for comprehensive assessment, additional evaluation and optimization of the patient's condition without delaying surgery and has the potential to reduce the number of late operating room cancellations due to newly discovered comorbidity. Present study was aimed to study the prevalence of specific medical conditions which were revealed on the preoperative evaluation, assess their risk for surgery and provide medical recommendations for the same.

MATERIAL AND METHODS

Present study was hospital based, observational study, conducted in department of anaesthesiology, at XXX medical college and hospital, XXX, India. Study duration was of 2 years (November 2012 to September 2014). Study was approved by institutional ethical committee.

Inclusion criteria

- All children up to 18 years of age referred for medical evaluation prior to elective surgery

Exclusion criteria

- All children up to 18 years of age undergoing emergency surgery.

All surgeries were divided into major and minor types based on one of the following criteria:

Type of surgery	MINOR	MAJOR
Duration of procedure	< 2 hours	>2 hours
Estimated blood loss	<500ml	>500ml
Anatomic region	All except visceral cavities, diagnostic endoscopic surgery, including laparoscopic cholecystectomy, laparoscopic herniotomy and thoracoscopic procedures without resection	Surgery of thorax and abdomen including laparoscopic bowel surgery (resection and anastomosis) and thoracoscopic lobectomy.
Pathophysiologic		Major hemodynamic and

interaction		respiratory changes caused by the procedure; major fluid shifts.
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A detailed medical history was obtained with respect to age, sex, residence, onset, duration and progress of current illness, coexisting medical disorder, and relevant past medical history. All patients underwent a routine laboratory work up including a complete blood count, serum electrolytes, PT, INR, APTT, HIV and HbsAg, urine routine and microscopy, chest X ray and any other specific test based on the clinical findings and any other abnormality found on routine investigations.

Medical condition was defined as any disorder or disease which was previously undiagnosed and was revealed on medical history, clinical examination or laboratory investigations. These previously undiagnosed medical conditions were noted. Standard age based hemoglobin levels were used to diagnose patients with anaemia. Various medical interventions were done for the previously undiagnosed medical conditions depending on their severity of the condition and their potential effect in the perioperative period.

Postoperative recovery of each patient was noted with relation to the effect of the medical condition in the perioperative period.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant

RESULTS

Out of 300 patients, maximum number of patients were between 2 and 5 years of age (34%) followed by < 2 years (30.3%), 5-10 years (24%) and between 10-18 years (11.6%). In present study 110 patients (36.7 %) had one or more previously undiagnosed medical condition. Maximum prevalence of medical conditions was seen in the age group of 10 – 18 years (51%). The prevalence in the age groups of less than 2 years, 2 years – 5 years, 5 years – 10 years was 17.6%, 44% and 43% respectively.

Table 1: Distribution of medical conditions with respect to age:

Age	Number of patients (%)	With medical conditions	Without medical conditions
< 2 years	91 (30.3 %)	16 (17.6 %)	75 (82.4 %)
2 years – 5 years	102 (34 %)	45 (44 %)	57 (56 %)
5 years – 10 years	72 (24 %)	31 (43 %)	41 (57 %)
10 years – 18 years	35 (11.6 %)	18 (51 %)	17 (49 %)
Total	300	110 (36.7 %)	190 (63.3 %)

Previously undiagnosed medical conditions were seen to be more prevalent in the female patients (46.3%) than in male patients (33%). The difference in the prevalence could be due to the difference in the admission rates of male and female patients for surgery.

Table 2: Gender-wise Distribution

Gender	Number of patients	With medical conditions
Male	218 (72.6 %)	73 (33 %)
Female	82 (27.4 %)	37 (46.3 %)

Of the 300 patients studied, 215 patients (71.6%) underwent major surgery and 85 (28.4%) patients underwent minor surgery.

Table 3: Distribution of patients with respect to type of surgery (n=300):

Type of surgery	Number of patients	Percentage
Major	215	71.6%
Minor	85	28.4%

Out of 300 patients studied, 72 patients (24%) had a past history of surgery, 10 patients (3.3%) had history of worms, 2 patients (0.6%) had history of pica, 1 patient (0.3%) had history of haematemesis and 1 patient (0.3%) had history of factor VIII deficiency.

Out of 300 patients studied, 82 patients (27.3%) were anaemic, 18 patients (6%) had eosinophilia on differential leucocyte count, 10 patients (3.3%) had worms in stool, 8 patients (2.6%) were suspected to have thalassemia trait/ minor (based on high RBC count, low haemoglobin and a normal red cell distribution width), 8 patients (2.6%) had dental caries. Other less common illness were wheeze (2%), undescended testes (1.3%), phimosis (1.3%), signs of vitamin B deficiency (1.3%), congenital heart disease (0.6%), extra hepatic portal hypertension due to splenic vein thrombosis (0.3%), hepatitis B (0.3%), renal calculus (0.3%), increased prothrombin time (0.3%), molluscum contagiosum (0.3%) and scabies (0.3%).

Table 4: Past and medical history of patients (n=300):

	Number of patients	Percentage
Past history		
History of surgery	72	24%
History of worms	10	3.3%
History of pica	2	0.6%
History of haematemesis	1	0.3%
History of factor VIII deficiency	1	0.3%
Present Medical conditions		
Anaemia	82	27.3%
Eosinophilia	18	6%
Worms in stool	10	3.3%
Suspected Thalassemia minor/trait	8	2.6%
Dental caries	8	2.6%
Wheeze	6	2%
Undescended testes	4	1.3%
Phimosis	4	1.3%
Vitamin B deficiency	4	1.3%
Congenital heart disease	2	0.6%
Extra hepatic portal hypertension	1	0.3%
Hepatitis B	1	0.3%
Renal calculus	1	0.3%
Increased PT	1	0.3%
Molluscum contagiosum	1	0.3%
Scabies	1	0.3%

In present study, majority of patients were diagnosed on the basis of clinical examination and investigation (76.3%), by routine investigations (25.4%), on clinical examination only (20.9%), on the basis of medical history only (11.8%) and 1 patient (0.9%) was diagnosed with the help of medical history, clinical examination and investigation.

Table 5: Various modalities used to diagnose the medical conditions (n=110):

Diagnosing modalities	Number of patients	Percentage
Clinical examination + investigations	84	76.3%
Investigations	28	25.4%
Clinical examination	23	20.9%
Medical history	13	11.8%
History + clinical examination + investigations	1	0.9%

Out of 110 patients requiring interventions, 72 patients (65.4%) required one intervention only, 32 patients (29.1%) required two interventions, and 6 patients (5.4%) required three or more interventions.

Common interventions in present study were iron and folic acid supplements (25.6%), antihelminthic medication (7.6%), steroids in the perioperative period (2.6%), advised thalassemia screening (2.6%), suggested tooth extraction (2.6%), Levosalbutamol nebulisation prior to the surgery (2%), blood transfusion (1.7%), suggested orchidopexy (1.3%), suggested circumcision (1.3%), multivitamins (1.3%), antibiotic prophylaxis for infective bacterial endocarditis (0.6%), injection vitamin K prior to the surgery (0.3%) was given, anti-scabies treatment (0.3%), curettage for lesions of molluscum contagiosum (0.3%), studies for renal calculus (0.3%), variceal ligation (0.3%).

Table 6: Distribution of patients with respect to number of medical interventions (n=110):

	Number of patients	Percentage
Number of interventions		
One	72	65.4%
Two	32	29.1%
Three or more	6	5.4%
Medical interventions		
Iron and folic acid	77	25.6%
Antihelminthic	23	7.6%
Steroids	8	2.6%
Suggested thalassemia screening	8	2.6%
Suggested tooth extraction	8	2.6%
Levosalbutamol nebulisation	6	2%
Blood transfusion	5	1.7%
Suggested orchidopexy	4	1.3%
Suggested circumcision	4	1.3%
Multivitamins	4	1.3%
Antibiotic prophylaxis for IBE	2	0.6%
Injection Vitamin K	1	0.3%

Anti-scabies treatment	1	0.3%
Curettage for skin lesion	1	0.3%
Suggested further biochemical studies	1	0.3%
Variceal ligation, Inj terlipressin	1	0.3%

DISCUSSION

The aims of this preoperative evaluation are fourfold: the probability of perioperative morbidity and mortality due to the scheduled surgical procedure is estimated, the required anaesthetic policy is determined, the parents are informed about anaesthesia and surgery and informed consent is obtained. If necessary, additional laboratory tests or consultation of other medical specialists are obtained. When indicated, the patients' physical condition will be improved by specific interventions, such as preoperative blood transfusion, optimization of pulmonary function etc.^{6,7}

Derya Erdogan *et al.*⁸ studied preoperative laboratory investigations in the paediatric surgery clinic in 3,693 patients who underwent elective outpatient surgery. They found that the most frequent abnormality revealed on routine preoperative evaluation was anaemia which is similar to our study. In present study anaemia was the most prevalent medical condition (27.3 %).

Sobia Khan *et al.*⁹ found that 74 out of 385 patients i.e. 19.4% had anaemia, which is comparable to our study. Similar results were obtained in a study conducted by Pal *et al.*,¹⁰ in where anaemia was the most common finding (19.4%) in the preoperative evaluation. Schwaab *et al.*,¹¹ studied the significance of blood tests prior to adenoidectomy and concluded that anaemia was the most prevalent condition revealed on preoperative evaluation. A study conducted by

In this study, various modalities were used in the preoperative evaluation to diagnose any previously undiagnosed medical condition in the patients. 13 patients (11.8%) were diagnosed on the basis of history only. 23 patients (20.9%) were diagnosed on clinical examination only, 28 patients (25.4%) were diagnosed on the basis of routine investigations only, 84 patients (76.3%) were diagnosed on the basis of clinical examination and necessary investigation based on clinical examination and 1 patient (0.9%) was diagnosed with the help of medical history, clinical examination and investigation. Thus a detailed medical history combined with skilful clinical examination followed by required investigation is the most effective method to diagnose any previously undiagnosed medical condition prior to the surgery compared to any single method alone.

Patel *et al.*,¹² found that in 13% of the patients, one or more medical condition could be diagnosed on the basis of medical history only, which is similar to our study. Aditya Kumar *et al.*,¹³ studied role of routine laboratory investigations in preoperative evaluation and concluded that thorough history, combined with physical examination of patient represents the best method for screening diseases followed by few selective tests as guided by patient's health condition, invasiveness of planned surgery and potential for blood loss. Similar results were obtained by Ranasinghe *et al.*,¹⁴ in the same year in a similar study conducted at Srilanka. Pasternak L R *et al.*,¹ highlighted the importance of eliminating the unnecessary routine preoperative laboratory tests and relying more on the history and clinical examination.

A study conducted by Mallick *et al.*,¹⁶ concluded that in the preoperative evaluation of paediatric surgical patients, a careful history and physical examination are of greater importance than routine laboratory investigations alone. Macpherson RD *et al.*,² concluded

that a sizeable proportion of routine laboratory investigation could be eliminated and that the laboratory tests could be guided effectively based on the history and clinical examination only.

Johnson RK *et al.*,³ conducted a study at Manchester regarding the necessity of routine laboratory screening and found that preoperative blood testing is useful in diagnosing a medical condition if the history and clinical examination necessitates. Kaplan *et al.*⁴ studied usefulness of preoperative laboratory screening in paediatric patients posted for elective surgery and concluded that, in the absence of specific indications, routine preoperative laboratory tests contribute little to patient care and could reasonably be eliminated.

None of the patients were found to have any medical condition that converted the surgical procedure to a high risk condition. All surgeries were done following routine valid written informed consent without the need for any special informed consent. The postoperative period was uneventful for all the surgeries and none of the medical condition diagnosed in the preoperative evaluation affected the outcome of the surgery.

In our study only mild to moderate anaemia was found on routine preoperative evaluation which was not associated with perioperative morbidity. This fact was supported by various studies. Sobia Khan *et al.*⁹ at concluded that routine preoperative haemoglobin estimation did not have any effect on the perioperative outcomes in asymptomatic patients who are planned for elective day care surgeries.

In the current study, all the patients with wheezing prior to the surgery were given preoperative corticosteroid and salbutamol nebulisation and none of the patients developed any perioperative complication thus concluding that steroids and levosalbutamol are helpful in perioperative complication in hyperreactive airway disease. Mitsuta K *et al.*,¹⁷ concluded that preoperative corticosteroid treatment reduces airway hyperresponsiveness and prevents perioperative attacks of asthma primarily by suppressing the production of inflammatory cytokines.

Similar results were obtained by Silvanus MT *et al.*¹⁸ concluded in their study that corticosteroids and inhaled salbutamol in patients with reversible airway obstruction markedly decrease the incidence of bronchospasm after tracheal intubation in asthma or hyperreactive airway disease. Meneghni *et al.*,¹⁹ reviewed charts of children who underwent minor surgical procedures, and concluded that a thorough clinical assessment of the patient is far more important than routine preoperative laboratory screening, which should be done only when justified by clinical examination.

A meticulous preoperative assessment is deemed necessary in paediatric patients as it helps to streamline the day of surgery, eliminate preventable causes of cancellation of surgery, familiarize the child and parents to the hospital, reduce the percentage of cancellations and operating room delays, and enhance the utilization of operating room time.

A careful preoperative assessment of the child undergoing a surgical procedure enables the paediatrician to assess the general state of health, identify the presence of chronic, acute or intermittent diseases, and recognize any anaesthetic concerns. From this knowledge, appropriate subspecialty consultation can be sought, the preoperative condition optimized for surgery, and necessary plans can be made to deal with any pre-or post-operative medical conditions.

CONCLUSION

Anaemia was seen to be the most common previously undiagnosed medical condition followed by eosinophilia and the third being worms in stool. The maximum number of medical conditions was diagnosed based on clinical examination with required investigation

while routine laboratory testing revealed only 1/4th of the conditions. Iron and folic acid was given to maximum patients (25.6%) while antihelminthic medication was given to 7.6% patients and steroids was given preoperatively to 2.6% patients.

REFERENCES

1. Pasternak LR. Preoperative testing: Moving from individual testing to risk management. *AnesthAnalg.* 2009;108:393–4.
2. MacPherson RD, Reeve SA, Stewart TV, Cunningham AE, Craven ML, Fox G, *et al.* Effective strategy to guide pathology test ordering in surgical patient. *ANZ J Surg.* 2005;75:138–43.
3. Johnson RK, Montimer AJ. Routine Preoperative blood testing: Is it necessary? *Anaesthesia.* 2002;57:914–7
4. Kaplan EB, Sheiner LB, Boeckmann AJ, Roizen MF, Beal SL, Cohen SN, *et al.* The usefulness of pre-operative laboratory screening. *JAMA.* 1985;253:3576–81.
5. Baron MJ, Gunter J, White P. Is the pediatric preoperative hematocrit determination necessary? *South Med J [Internet].* 1992 Dec [cited 2014 Dec 6];85(12):1187-9.
6. JL Apfelbaum, RT Connis, DG Nickinovich, Practice advisory for preanesthesia evaluation: an updated report by the American Society of Anesthesiologists Task Force on Preanesthesia Evaluation, *Anesthesiology*, 116 (3) (2012), pp. 522-538
7. ZA Haq, P Murthy, I Malik, VU Lahori, S Chaudhary, S Ahuja, Detection of comorbid illnesses during pre-anaesthesia evaluation in a university teaching hospital: A prospective observational study *Natl Med J India*, 27 (5) (Sep-Oct 2014), pp. 256-258
8. Derya Erdoğan, Özlem Balcı, Ayşe Karaman, İbrahim Karaman and Hakan Çavuşoğlu (2013), "Value of Preoperative Laboratory Tests in Elective Pediatric Outpatient Surgery," *Pediatrics Research International Journal*, Vol. 2013 (2013), Article ID 589490
9. Khan S, Khan MU, Samad K. Can simple preoperative hemoglobin testing screen symptomatic anemia in patients undergoing ambulatory surgery in third world countries? *Open J Anesth* 2012;2:150-3.
10. K. M. Pal, I. A. Khan and B. Safdar, "Preoperative Work up: Are the Requirements Different in a Developing Country?" *Journal of Pakistan Medical Association*, Vol. 48, No. 11, 1998, pp. 339-341.
11. Schwaab M, Hansen S, Gurr A, Dazert S. Stellenwert der Blutabnahme vor Adenotomie [Significance of blood tests prior to adenoidectomy]. *Laryngorhinootologie.* 2008 Feb;87(2):100-6. German.
12. Patel MS, Carson JL. Anemia in the preoperative patient. *Med Clin North Am.* 2009;93(5):1095-1104.
13. Kumar A, Srivastava U. Role of routine laboratory investigations in preoperative evaluation. *J Anaesthesiol Clin Pharmacol.* 2011;27(2):174-179.
14. Ranasinghe P, Perera YS, Abayadeera A. Preoperative investigations in elective surgery: Practices and costs at the national hospital of Sri Lanka. *Sri Lankan J Anaesthesiol.* 2010;18:29–35.
15. Pasternak LR. Preoperative testing: Moving from individual testing to risk management. *AnesthAnalg.* 2009;108:393–4.
16. M. S. Mallick, "Is Routine Preoperative Blood Testing in Children Necessary?" *Saudi Medical Journal*, Vol. 27, No. 12, 2006, pp. 1831-1834
17. Kazuko Mitsuta, Terufumi Shimoda, Chizu Fukushima, Yasushi Obase, Hiroyoshi Ayabe, Hiroto Matsuse, Shigeru Kohno, Preoperative Steroid Therapy Inhibits Cytokine

Production in the Lung Parenchyma in Asthmatic Patients, *Chest*, Volume 120, Issue 4, 2001, Pages 1175-1183.

18. Silvestri L, Maffessanti M, Gregori D, Berlot G, Gullo A. Usefulness of routine preoperative chest radiography for anaesthetic management: A prospective multicentre pilot study. *Eur J Anaesthesiol.* 1999;16:749–60.
19. Meneghini, L., Zadra, N., Aneloni, V., Metrangolo, S., Faggin, R. and Giusti, F. (2003), Erythropoietin therapy and acute preoperative normovolaemic haemodilution in infants undergoing craniostomy surgery. *PediatricAnesthesia*, 13: 392-396.