

Research Article

Endoscopic and Clinicopathological Patterns of Upper Gastrointestinal Conditions with Endoscopic Examinations at Bugando Medical Centre Mwanza Tanzania

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Abstract

Background: Upper Gastrointestinal endoscopy is a safe procedure, and widely available technique for investigation of upper GI conditions. The demand for the investigation continues resulting in an increase number of endoscopic procedures. This observation little information is available in BMC regarding the profile of patients attending for endoscopic examination. The study aim to determine the endoscopic and clinicopathological patterns of upper GI tract conditions and establish agreement between biopsied endoscopic findings and histopathological findings of upper GI tract conditions among patients attending BMC. **Methodology:** This was a cross-sectional study involving patients with upper gastrointestinal tract conditions receiving endoscopic examination with or without biopsy at BMC between January and May 2020. Recruitment of patient based on serial technique and endoscopic examination done under short sedation. Biopsy were taken on the same sit in eligible patient and preserved in 10% formalin for further histology evaluation. **Results:** Total of 150 participants were included in the study, 139 (92.7%) were attended from outpatient clinics and 11 (7.3%) from inpatients. The median age was 50[IQR 34-65] years. Dyspepsia was the leading clinical presentation 87 (58.0%). In the study population, 141 (94.0%) had abnormal endoscopic findings. Gastritis was the leading finding in both endoscopic and histopathological finding with 41(29.1%) and 36(32.1%). Among patients with abnormal histopathological findings, 23 were esophageal malignancies, 10 gastric malignancies, and 1 duodenal malignancy. The Kappa value 0.778 considered a substantial agreement between endoscopic findings and histopathological findings where K value interpreted as <0.4 as fair, 0.4 to 0.6 as moderate, 0.6 to 0.8 substantial and >0.8 near perfect. **Conclusion:** Dyspepsia was the commonest clinical presentation among the study participants while gastritis was the leading finding on both endoscopic and histopathological results, followed by esophageal and gastric malignancy. There is substantial agreement between endoscopic and histopathological findings; therefore endoscopy is incomplete without biopsy and histopathology as the gold standard for the diagnosis of upper gastrointestinal conditions.

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Keywords

Endoscopic, Clinicopathological, Gastrointestinal Conditions, Tanzania

1. Introduction

Upper gastrointestinal tract (GI) conditions are common encountered problems in the clinical practice, and can be associated with high morbidity and mortality [1, 2]. The distribution of these upper gastrointestinal lesions varies significantly in different countries and within geographic locations in the same nation [19]. Furthermore, symptoms of these causes often overlap and this makes etiological diagnosis difficult. Endoscopy is the ideal procedure for identifying organic diseases of the foregut, but this service is yet to be widely available in developing countries like Tanzania. Upper GI conditions represent a wide spectrum of diseases involving the esophagus, stomach and the duodenum. These conditions includes a wide range of pathologic conditions like inflammatory conditions, mechanical conditions, upper GI varices, peptic ulceration, neoplasm, Mallory-Weiss tear, hiatus hernia, gastro-esophageal reflux disease (GERD) and vascular malformations [3-5]. The disease spectrum has a wide range of clinical severity, ranging from mild to severe and potentially life-threatening pathologies [6]. The risk factors like smoking, alcohol, tobacco, food habits, drugs, physical or mental stress, foreign bodies and infections plays an important role in predisposition and progression of these disease [3]. *Helicobacter pylori* bacteria is a gram negative, spiral shaped, flagellated, bacillus which is associated with a number of upper gastrointestinal disorders, including chronic active gastritis, peptic ulcer disease and gastric cancer [7]. Also Cytomegalo virus (CMV), candida albicans and occasionally herpes virus in immunocompromised patient leads to chronic esophagitis [8]. The epidemiology of upper gastrointestinal disease in industrialized populations is evolving rapidly [7, 9, 10] and decreasing trends of peptic ulceration [11] and gastric cancer [9] are attributed to declining prevalence of *Helicobacter pylori* infection [12]. Esophageal squamous cell carcinoma remains the most predominant cancer worldwide, although in developed countries there is a shift to adenocarcinoma due to increase in gastroesophageal reflux and change of life style [10]. Adenocarcinoma is the predominant type in Western countries [13]. In US, adenocarcinoma of the esophagus is reported to be the most common malignancy with the fastest growing incidence, having increased six times in three decades [14]. In Africa, lack of data impedes understanding of the current epidemiology of upper gastrointestinal disorders and there is almost no insight into trends over time [5, 15]. The patterns of upper GI tract diseases have been reported in literature to vary from one place to another [3], and therefore it is important to conduct the studies periodically in every region

to define the local causes of upper GI tract diseases so that effective preventive measures can be taken [1-4]. Previously, the diagnosis of upper GI tract diseases was based on clinical and barium swallow or barium meal studies [1]. Upper GI endoscopy has recently been recognized as the standard investigation of choice for patients with upper GI symptoms since it plays an important role in the diagnosis and therapy, reducing mortality, hospital stay and health care costs [1, 3]. Endoscopy of the upper GI is a simple, safe and well tolerated procedure, visualization of the site with pathology and biopsy can be taken to detect the pathological process also institution of appropriate therapy [6, 16]. In Tanzania and many developing countries, upper GI endoscopy services are not readily available or affordable for most patients. This has limited the gathering of precise data on the etiology of upper GI symptoms as most patients are treated without endoscopic evaluation [17-21]. At Bugando Medical Centre, data on upper gastrointestinal diseases are limited despite establishment of endoscopy services more than a decade ago. There has been a previous report about endoscopic findings in patients with upper gastrointestinal bleeding. While this data is informative, its coverage is limited only to those patients presenting with upper gastrointestinal bleeding [21]. There was thus a need for more data on upper gastrointestinal diseases from this part of Tanzania. The aim of this study was to determine the endoscopic and clinicopathological patterns of upper gastrointestinal tract conditions among patients undergoing endoscopic examination at BMC, and to establish agreement between endoscopic and histopathological findings of upper gastrointestinal tract conditions.

2. Material and Methods

2.1. Study Design

This was a cross sectional study from January to June 2020.

2.2. Study Area and Setting

The study was conducted in the Endoscopic unit, Operating Theatre and histopathology department of the Bugando Medical Centre (BMC). BMC is a consultant, tertiary care and teaching hospital for the Catholic University of Health and Allied Sciences-Bugando (CUHAS-Bugando) and has 950 beds. The hospital is located in Mwanza City in the

North-western Tanzania and serves as a referral centre as tertiary specialist care for a catchment population of approximately 17 million people from neighboring regions including Mara, Kagera, Mwanza, Geita, Shinyanga, Simiyu, Tabora and Kigoma. The endoscopy unit of Bugando Medical Centre was established in 2006. The unit is running well by trained three endoscopist with experience of minimum three years who are consultant physicians, surgeon. The unit operates from Monday to Friday, also on emergency basis with an average of 15 patient scoped per day of which 3 to 5 are biopsied. Operating theatre of BMC is a building with 10 operating rooms where every surgical unit has its own room for their list to carry on, and rigid scoping is done twice a week with average of 5 patient per day and 2 to 3 biopsy.

2.3. Sampling Strategy and Sample Size

Patients who consented to undergo endoscopy examinations at BMC with symptoms and signs of upper GI condition, during the study period were included in a serial sampling method until the desired sample size was reached.

2.4. Data Collection

A structured, coded and pre-tested data collection tool designed for the purpose of the study was used. Information collected included; demographic information (age, sex, area of residence), clinical presentation, indications for upper GI endoscopy, endoscopic findings, histopathological findings. This was done by PI and RA at the endoscopic unit and operating theatre of BMC. All data collected from this study were entered to the computer Microsoft excel 2007 and then transferred into STATA version 13 for analysis.

2.5. Data Analysis

The median interquartile range and ranges were calculated for continuous variables whereas categorical variables were summarized into proportions and percentage while numerical variables in mean, median and standard deviation. The Kappa value 0.778 calculated were considered statistically significant in the analysis of establishing the level of agreement between endoscopic findings and histopathological findings where K value interpreted as <0.4 as fair, 0.4 to 0.6 as moderate, 0.6 to 0.8 substantial and >0.8 near perfect.

2.6. Ethical Consideration

Approval to conduct the study was sought from CUHAS/BMC Research and ethical committee (CREC) with clearance no 424/2020. Also permission to carry out the study was obtained from the hospital authority at BMC. Enrolled patients signed a written informed consent for the study and endoscopic examination. Patients assured that the information collected to be maintained under strict confidentiality. Consent for under 18 years patient was sought from parents / guardians and right to withdraw at any time.

3. Results

3.1. Enrolment of Patients

During the period of the study a total of 156 patients were screened, of them 6 were excluded, and 150 patients were eligible for the study until analysis. [Figure 1](#) summarises.

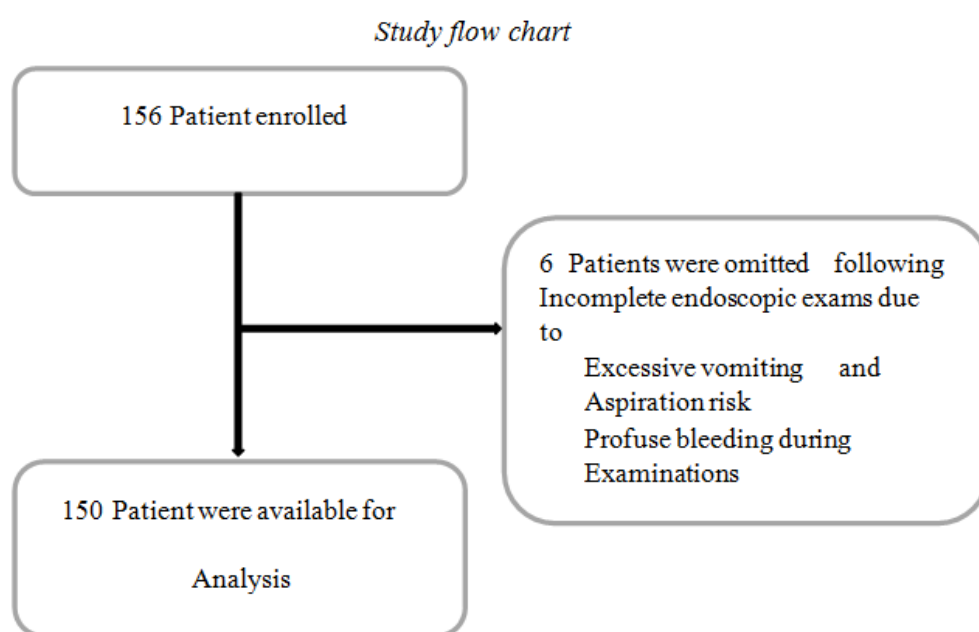


Figure 1. Study flow chart.

3.2. Social Demographic and Patients Characteristics

Among 150 patients enrolled, the youngest patient was 9 years old and the oldest was 99 years old with a median age of 50 [IQR 34-65] years. Seventy-nine (52.7%) were males with a male to female ratio of 1.1: 1 as shown in Table 1.

Table 1. Socio-demographic and patients characteristics of the study population (N=150).

Variable	Frequency(n)	Percent (%)
Age(years)		
<55(median 50)	88	58.6
≥55(IQR 34-65)	62	41.4
Gender		
Male	79	52.7
Female	71	47.3
Attended From		
Outpatient	139	92.7
Inpatient	11	7.3
Residence		
Urban	84	56.0
Rural	66	44.0
Education Level		
Primary/Secondary	95	63.3
College/University	55	36.7
Marital Status		

Variable	Frequency(n)	Percent (%)
Single	43	28.7
Married	107	71.3
Occupation		
Employed	57	38.0
Unemployed	24	16.0
Peasant	69	46.0
Mode of Cost sharing		
Insured	90	60.0
Not Insured	60	40.0
Risk Factors		
Smoking	14	9.5
Alcohol	50	33.8
Corrosives	1	0.7
NSAIDs	11	7.4
Stress	72	48.6

3.3. Endoscopic Findings (Patterns) of Upper Gastrointestinal Tract Conditions

Among 150 patients, 141(94.0%) had abnormal endoscopic findings, gastritis was the most common endoscopic finding accounting for 41(27.3) % and the least was esophageal stricture and gastric outlet obstruction with 1(0.7%) each, as shown in Table 2. Out of 141 abnormal endoscopic findings 29 (20.6%) were not biopsied due to different reasons as presented in Table 3.

Table 2. Endoscopic findings among patients with upper GI tract conditions at BMC (n=150).

Endoscopic findings	Frequency(n)	Percentage (%)
Normal	09	6.0
Oesophageal mass	27	18.0
Gastric mass	11	7.3
Gastritis	41	27.3
Gastric ulcer	18	12.0
Duodenal ulcer	18	12.0
Gastroesophageal reflux disease	07	4.7
Oesophageal stricture	01	0.7
Oesophageal/Gastric varices	17	11.3

Endoscopic findings	Frequency(n)	Percentage (%)
Gastric outlet obstruction	01	0.7
Total	150	100

Table 3. Abnormal endoscopic findings not biopsied and reasons.

Endoscopic findings	Reasons
Gastroesophageal reflux disease(GERD)	Erosive esophagitis with LES muscle failure to close tightly
Esophageal/gastric varices	They are enlarged vein in esophagus and gastrum due to portal vein obstruction.
Esophageal stricture	Narrowing of lumen due to corrosive ingestion
Gastric outlet obstruction	An obstruction at the pylorus which is the outlet of the stomach.

3.4. Clinicopathological Patterns of Upper Gastrointestinal Tract Conditions

3.4.1. Clinical Presentation of Upper GI Tract Conditions

In this study, dyspepsia was the leading clinical presentation of upper gastrointestinal tract conditions accounting for 87% of cases (Figure 2).

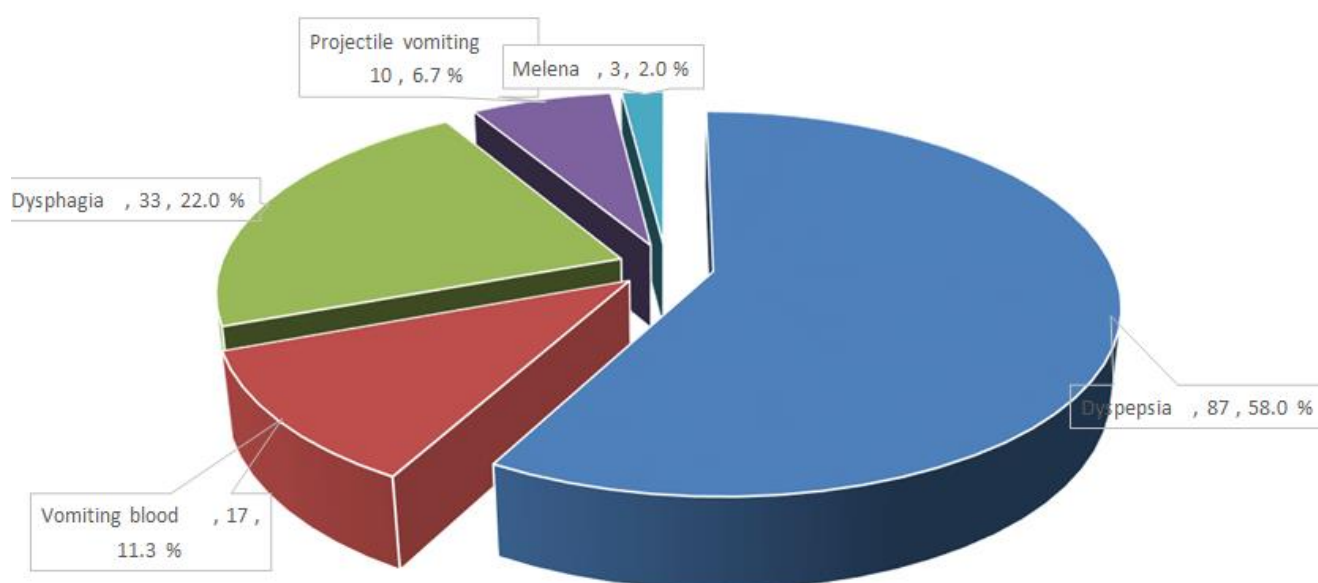


Figure 2. Distribution of patients according to clinical presentation (N=150).

3.4.2. Histopathological Patterns of Upper Gastrointestinal Tract Conditions

Among 141 patients with abnormal endoscopic findings, 112 patients had biopsy done. Of them 100 (89.3%) had abnormal histopathological findings and 12(10.7%) had normal findings. Gastritis was the most common finding accounting

for 41 (32.1%) of cases, and the least finding was duodenal polyp and barret oesophagus each with 1 (0.9%). Among 100 patients with abnormal histopathological findings, 23 patients had esophageal malignancies, 10 patients had gastric malignancies, and 1 had duodenal malignancy. (Table 4 summarises)

Table 4. Histological results based on anatomical site.

Anatomical site	Histopathological results							Total
	SCC	Adenocarcinoma	GIST	Barret Esophagus	Gastritis	Duodenitis	Polyyps	
Oesophagus	17	6	-	1	-	-	-	24
Gastric		6	4	-	51	-	-	61
Duodenum	-	1	-	-	-	13	1	15
Total	17	13	4	1	51	13	1	100

3.5. The Agreement Between Biopsed Endoscopic and Histopathological Findings of Upper Gastrointestinal Tract Conditions

The study has demonstrated that there was a substantial agreement between biopsed endoscopic findings and histopathological findings (Kappa=0.778).

Table 5. The agreement between biopsied endoscopic findings and histopathological findings among the study population.

Endoscopic	Histopathology		Kappa
	Benign	Malignancy	
Benign	64	2	0.778
Malignancy	1	32	

$$\text{Kappa} = \frac{(\text{Agreement} - \text{Expected Agreement})}{(1 - \text{Expected Agreement})}$$

$$\text{Agreement} = (96/99) * 100 = 0.969$$

$$\text{Expected Agreement} = ((47/99) * (55/99)) + ((79/99) * (74/99)) = 0.860$$

$$\text{Kappa} = (0.969 - 0.860) / (1 - 0.860) = 0.778$$

K value is 0.778 signifies substantial agreement

4. Discussion

Upper gastrointestinal tract (GI) conditions are common encountered problems in the clinical practice and can be associated with high morbidity and mortality [1, 2]. It represents a wide spectrum of diseases involving the oesophagus, stomach and duodenum. Upper GI Endoscopy is the ideal procedure for identifying organic disease of the foregut [19]. In this study, the median age of the patients who underwent endoscopy was 50 years. This is slightly higher than 47 years, and 36 years that was found in Nigeria and Ethiopia [25, 26].

The reason for this is that this age group is the most active in engaging on different activity to satisfy their families in one way or another.

In the present study, male were predominantly scoped due to the fact that they are prone to strenuous activity with poor eating habit 48.6%, alcohol 33.8% and smoking 9.5% with regards to their daily activity. Similar results were also observed in the study done in Kilimanjaro Tanzania and Nigeria, which showed male predominance were attributed to greater degree of exposure to various risk factors as compared to the female patients [14, 19] which are alcohol, smoking, use of hot beverages.

The majority of patients in this study came from urban areas. This is due to most of the endoscopic services are available in urban unlike rural and clinicians who are capable in diagnosing these conditions are found in urban areas, also the risks factors for upper GI conditions are higher in urban areas. Most of patients coming from rural areas cannot afford to pay for the investigation as has been demonstrated in this study whereby the majority were insured. This observation is in contrast with other studies which showed that the majority of the patients came from rural areas located a considerable distance from health facilities, due to high prevalence of H.pylori infection in a low social economic status society in rural areas [27].

This study found that the leading endoscopic finding was gastritis, which is attributed by risk factors such as strenuous activity, alcohol consumption and smoking. These findings are similar to the study done in western Uganda and Kilimanjaro in Tanzania which showed gastritis in 40.2% and 61.1% respectively [19, 27]. This could be due to majority of the patient have preliminary tested positive of H.pylori infection despite fact the H.pylori infection is the leading risk factor associated with gastritis on them. This study cannot rule out that risk because H.pylori test was not done due to invariability of the gold standard tests, urease breath test in our laboratory which contributed with the pandemic of Covid 19 infection.

In this study, gastritis was found to be more prevalent in the 31 to 60 years age group which is similar findings as observed in the retrospective study of 2198 patients in India which determined the pattern of various upper GI diseases diagnosed with upper GI

endoscopy in the rural area of Tamilnadu. This study revealed gastritis was the most frequent endoscopic findings and was more common in the 31-50 age groups [24, 28]

The present study shows upper gastrointestinal malignancies were suspected in 25.3% of the patients who were scoped, and all were above 40 years. Similar findings were demonstrated in the study done by Obayo et al in Uganda where malignancy condition was suspected in patients older than 40 years. In this study majority of the normal endoscopic findings were found in patients aged 21 to 30 years and accounted for 16.7%. Similar findings were seen in the study done in Uganda where patients younger than 40 years had normal findings at endoscopy [27].

The present study found dyspepsia 58.0% of the patients as the most common clinical presentation. This can be due to the fact that most of participant in our study came with symptoms such as epigastric pain, post prandial abdominal fullness, heart burn, early satiety of at least three episodes per week in 3 months without relief under medical therapy, or persistent heart burn. This finding is similar to the study which was done in India and Nepal which shows 62% and 56% respectively. This is attributed with poor dietary habit including time interval between meals and other excessive beverage intake containing preservatives for refreshments [22, 24].

In histology, the most common site from which the biopsies were taken was stomach followed by esophagus and duodenum. Gastritis was the leading finding 32.1%, of which is not in line with other studies done in India shows 9% and 16% [22, 29]. The reason of this difference could be that in our study we had biopsy in only patient with abnormal endoscopic findings while in other studies biopsy were taken from all patient who were scoped regardless it was normal or abnormal endoscopic finding. The common malignant lesion was the squamous cell carcinoma 15.7% from esophagus. Adenocarcinoma 11.6% lies in all three areas, intestinal type and signet ring were found in the stomach [23].

The strength of agreement between biopsied endoscopic findings and histopathological finding shows a good reproducibility, with a weighted kappa value of 0.778 which signifies a substantial agreement. The possible explanations for this could be in this study we took biopsy only in those patients with abnormal endoscopic findings but there also existence of 22.2% disagreement from the inconsistency which may partly explained by the quality of the biopsy specimens obtained, of which some were fragments of necrotic tissues, others were crushed or composed of mucosa with coincidental sampled in a wrong position or might require endoscopic Ultrasound to locate the submucosal lesions of which we do not have in our settings.

5. Conclusion

Dyspepsia was the commonest clinical presentation among the study participants while gastritis was the leading finding on both endoscopic and histopathological results, followed by

esophageal and gastric malignancy. There is substantial agreement between endoscopic and histopathological findings, therefore endoscopy is incomplete without biopsy and histopathology as the gold standard for the diagnosis of upper gastrointestinal conditions, combination of these two methods provide a powerful diagnostic tool for better patient management.

Abbreviations

BE	Barrett Esophagus
BMC	Bugando Medical Center
CREC	CUHAS BMC Research and Ethics Committee
CUHAS	Catholic University of Health and Allied Science
ESGE	European Society of Gastrointestinal Endoscopy
GERD	Gastro Esophageal Reflux Disease
GI	Gastro Intestinal
GIST	Gastro Intestinal Stromal Tumor
GIT	Gastro Intestinal Tract
HIV	Human Immunodeficiency Virus
H.Pylori	Helicobacter Pylori
IQR	Inter Quartile Range
NSAIDs	Non-Steroidal Ant inflammatory Drugs
PI	Principal Investigator
RA	Research Assistant
WHO	WorldHealth Organization

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Author Contributions

Furaha Munema: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Resources, Software, Writing – original draft, Writing – review & editing

Peter Rambau: Conceptualization, Formal Analysis, Investigation, Supervision, Validation, Visualization, Writing – review & editing

Samwel Byabato: Conceptualization, Formal Analysis, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

Ahmed Binde: Formal Analysis, Methodology, Software, Visualization, Writing – review & editing

Ndakibae Mabega: Formal Analysis, Visualization, Writing – review & editing

Availability of Data and Material

The database used and analyzed during the current study is

available from the corresponding author and will be available on request.

Declaration

Approval to conduct the study was sought from CUHAS/BMC Research and ethical committee (CREC) with clearance no 424/2020. Also permission to carry out the study was obtained from the hospital authority at BMC. Enrolled patients signed a written informed consent for the study and endoscopic examination. Patients assured that the information collected to be maintained under strict confidentiality. Consent for under 18years patient was sought from parents / guardians and right to withdraw at any time.

Consent for Publication

All authors approved it for publication.

Conflicts of Interest

The authors declare no conflicts of interest.

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