

## Original Research Article

## Clinical Profile, Treatment Modalities and Outcomes among Patients with Upper Aero-Digestive Tract Emergencies at Bugando Medical Centre, Mwanza, Tanzania

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**Abstract: Background:** Emergencies of the upper aero-digestive tract emergencies (UADTEs) are common in our setting, can be life threatening, challenging to the otolaryngologists and yet there is a paucity of clinical studies on these emergencies. This study aimed to determine the clinical profile, treatment modalities and outcomes of upper aero-digestive tract emergencies at Bugando Medical Centre (BMC), Mwanza, Tanzania. **Methods:** Between January and May 2019, a cross sectional study involving patients presenting with a clinical diagnosis of UADTEs was conducted at BMC. Data on socio-demography, clinical presentation, duration of symptoms, time interval between admission and intervention, type of intervention, postoperative complications and length of hospital stay were collected in questionnaire designed for the study. Ethical clearance was obtained from the Joint CUHAS/BMC Research, Ethics and Review Committee. **Results:** Of 487 ENT emergencies seen during study period, 128 (26.3%) patients had UADTEs. Male outnumbered females by a ratio of 1.5: 1. Their median age at presentation was 5 [range, 2-40] years. The major causes of UADTEs were foreign body ingestion, head& neck tumors and foreign body aspiration and cut-throat injuries that were seen in 56(43.8%), 33(25.8%), 25(19.5%) and (3.9%) respectively. The most frequent presentations were dysphagia 81(63.3%), difficulty in breathing 61(47.7%) and odynophagia 56(43.8). Poor outcome following esophagoscopy was associated with younger age (0-17 years) (p=0.02), prolonged duration to treatment (p=0.04) and low blood oxygen saturation (SPO2) (p=0.04). In addition, delayed duration to treatment (p=0.01) and foreign body ingestion (p=0.001) were significantly associated with prolonged hospital stay. **Conclusion:** At Bugando Medical Centre, UADTE pose a serious burden and challenge. Peripheral hospitals should be equipped with trained health workers and basic equipment to resuscitate and manage these patients before they are referred to otolaryngologists.

**Keywords:** Upper aero-digestive tract emergencies, clinical profile, treatment modalities, outcomes, Tanzania.

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## BACKGROUND

Emergencies of the upper aero-digestive tract are not uncommon in clinical practice and constitute a significant cause of morbidity and mortality worldwide (Furtado *et al.*, 2011; Salih *et al.*, 2016). Diseases causing upper aero-digestive tract emergencies (UADTEs) range from that can be effectively and easily managed by the duty physician with an excellent prognosis, to the complex ones that require prompt diagnosis and intervention by the otolaryngologists (Onotai & Ibegwe., 2012). In resource-limited countries like Tanzania, UADTEs are among the most common

and potentially life-threatening conditions that need urgent assessment and aggressive management (Gilyoma& Chalya., 2011; Gilyoma & Chalya., 2013; Kirfi *et al.*, 2014). At Bugando Medical Centre (BMC), UADTEs are the most common causes of otolaryngological admissions and contribute significantly to high morbidity and occasionally mortality (BMC-Medical records database 2019/2020, unpublished).

The clinical profile and treatment modalities of UADTEs differ worldwide, reflecting geographical differences in common disease states (Kirfi *et al.*, 2014).

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The causative factors also differ according to different age groups in adults and children (Perez *et al.*, 1995). In children and elderly patients, UADTEs are commonly caused by foreign bodies (FBs) in the larynx and esophagus and with high rates of morbidity and mortality (Gilyoma & Chalya., 2013). Moreover, children's population is potential for aspiration and ingestion of FBs (Onotai & Ebong., 2011; Ibegwe *et al.*, 2012). In adults, the commonest emergences seen are blunt and penetrating traumas to the neck following road traffic accidents, cut throat and gunshot injuries. These conditions can result in life-threatening situations that require immediate intervention by the duty doctor in the emergency department before referring the patients to the otolaryngologists (Rathlev & Medzon., 2007; Mohammad *et al.*, 2011). Cut throat injuries pose a great challenge because of multiple vital structures that are vulnerable in the small, confined and unprotected area (Bhattacharjee *et al.*, 1997; Okoye & Oteri., 2001; Manilal *et al.*, 2011; Gilyoma & Chalya., 2014). Other causes of UADTEs include corrosive ingestion, thermal burns, obstructive tonsillitis with its complications and head and neck tumors (laryngeal cancers, thyroid tumors & pharyngeal tumors) (Offer *et al.*, 1995; Onotai & Nwogbo., 2010). Usually, the clinical features of UADTEs depend upon the etiological factor and time of presentation to the hospital. For instance, a large FB occluding the upper airway or esophagus may lead to severe symptoms like severe respiratory distress; dysphagia and even sudden death (Bleach *et al.*, 1994; Lasis *et al.*, 2006), while injuries of long standing duration may be associated with complications such as mucosal ulcerations, esophageal obstruction, laryngeal stenosis and esophageal diverticulum (Brady., 1991). Either way, early diagnosis and treatment of these emergencies is essential strategy to prevent morbidity and mortality.

The management of UADTEs poses diagnostic and therapeutic challenges to Otolaryngologists practicing in resource-limited countries. Late presentation of the disease, late diagnosis and late referral to hospital coupled with lack of modern diagnostic and therapeutic facilities are among the hallmarks of the disease in developing countries (Lasis *et al.*, 2006; Gilyoma & Chalya., 2011; Ibegwe *et al.*, 2012; Gilyoma & Chalya., 2013; Gilyoma & Gilyoma & Chalya., 2014; Nakku *et al.*, 2016). It has been reported that UADTEs continue to be associated with significant morbidity and mortality despite recent advances in both pre-operative diagnosis and postoperative care (Singh *et al.*, 2014; Shetty & Gangadhar., 2015). Understanding the factors responsible for increased morbidity and mortality in these patients will better guide appropriate management and lead to improved survival (Majori *et al.*, 2011; Showkat *et al.*, 2015). This study aimed at describing the clinical profile, treatment modalities and outcomes among patients with UADTEs at BMC, a tertiary care hospital in northwestern Tanzania.

## METHODS AND PATIENTS

### Study design and setting

This was a cross sectional study involving patients presenting with a clinical diagnosis of UADTEs that was conducted at the EMD, ICU, OT, Otolaryngological wards and clinics of Bugando Medical Centre from January to May 2019. Bugando medical Centre is a consultant and a teaching hospital located in Mwanza city in the Lake zone, North-Western Tanzania, serving a population of approximately 18 million people. It is a tertiary care and a teaching hospital for the Catholic University of Health and Allied Sciences (CUHAS) – Bugando. The hospital has a bed capacity of 960 and handles most of the otolaryngological cases from eight Lake Zone regions (Mwanza, Geita, Mara, Kagera, Shinyanga, Tabora, Kigoma, Simiyu and Singida). About 15-20 patients with various otolaryngology conditions are attended daily in the EMD at BMC and among them, 4-6 presents with UADTE (BMC-Medical records database 2019/2020, unpublished).

### Study Population

The study population included all patients diagnosed with UADTEs and treated at BMC during the period of the study and those who consented for the study. Patients known to have any chronic condition of the UADT (e.g. Tumors, chronic laryngitis) and those who died while in admission before completing the intervention were excluded from the study. The sample size was calculated using the Yamane Taro formula [ ], whereby a total of 128 patients with UADTs were recruited in the study. Sampling of eligible patients was performed serially until the sample size was reached. Independent (predictor) variables included demographic data (age, sex, residence), clinical presentation, duration of symptoms, time interval between admission, intervention and/or discharge, diagnosis of UADTEs on admission (etiologies of UADTEs) and Intervention done (esophagoscopy, tracheostomy, forgarty catheter). The dependent variables included post-operative complications (like hemorrhage, surgical site infections, hemorrhagic shock, aspiration pneumonia, pulmonary embolism, deep venous thrombosis (DVT), reactional anesthesia, pyrexia etc), length of hospital stay and in-hospital mortality. This information was collected using a pre-tested questionnaire

Recruitment of patients to participate in the study was conducted at the Emergency department, Otolaryngological ward ENT clinic, and other wards of BMC, which are the main entry points for potential patients with UADTEs. The principal investigator together with fellow residents screened all arriving patients. Patients were recruited after meeting the eligibility criteria and obtaining a written informed consent from patients themselves and/or parents/caregivers.

Evaluation of patients was largely clinical, supported by laboratory tests and radiological

investigation. A detailed history regarding demographic data (age, sex, area of residence, occupation), clinical presentation, duration of symptoms, diagnosis on admission clinical, laboratory or imaging), treatment offered, type of surgical intervention, time interval between admission and surgery and outcome of management was obtained from the patients, parents or care givers.

Resuscitation was administered according to the hospital protocol before recruiting eligible patients. Patients were then either taken to the operating theatre for emergency surgery or admitted to Otolaryngological wards. Necessary investigations were completed and further treatment instituted. Patients who required ventilator support were admitted in the ICU. In the operating theatre, either a consultant Otolaryngological surgeon or a senior resident in otolaryngology under the direct supervision of a consultant surgeon performed operations. Postoperatively, patients were managed appropriately either in Otolaryngological ward or in ICU depending on their clinical condition and the departmental standard operating procedures. Follow up of each patient until after 30days post-discharge was done.

Individual diagnoses of upper aero-digestive tract emergencies were based on clinical presentations, physical examinations and radiological findings.

#### Diagnostic procedures

- FB ingestion was diagnosed when the patient presents with history ingestion of foreign material which resulted in dysphagia, odynophagia or drooling of saliva and/or radiological confirmation and/or a direct visibility of the object.
- Foreign body aspiration was diagnosed when a victim has acute choking or severe coughing with respiratory distress or stridor and confirmed by respiratory examinations or radiologically (Shetty S, Gangadhar., 2015; Nakku *et al.*, 2016).
- Vocal cord paralysis was diagnosed when the patient presented with history of DIB or difficult in phonation following recurrent laryngeal nerve palsy or pathologies of muscles, cartilages or membranes that support the vocal cord.
- Laryngeal tumors were diagnosed when the patient presents with history of DIB caused by airway obstruction and hoarseness of the voice and confirmed radiologically or by direct

visualization intra-surgically.

- Patients with mid facial fractures were diagnosed when the fractures involved the area between a superior plane drawn through the zygomatico-frontal suture tangential to the base of the skull and an inferior plane at the level of the maxillary dental occlusal surfaces.
- Deep space neck infection was diagnosed when the patient presents with fever, neck mass, odynophagia, dysphagia, sore throat, and decreased oral intake.
- A cut throat injury was diagnosed when a patient present with incised injuries in the anterior neck inflicted by sharp objects.

#### Statistical Data Analysis

Statistical data analysis was done using SPSS software (Statistical Package for the Social Sciences, version 22.0 (SPSS Inc, Chicago, Ill, USA). Data were summarized in proportions and frequency tables for categorical variables. Continuous variables were summarized using median, mean and range. P-values were computed using Chi-square ( $\chi^2$ ) test and Fisher's exact test was used for categorical variables. Wilcoxon Rank-sum (Mann-Whitney) test was used for continuous variables because the distribution of variables was not normal. To determine factors associated with length of hospital stay, univariate analysis was used. For the factors with P value less than 0.05, multivariate logistic regression analysis was employed. A factor with a p-value less than 0.05 was considered to constitute a statistically significant.

## RESULTS

During the study period, a total of 487 patients presented to Bugando Medical Centre with different otolaryngology emergencies. Of these, 128(26.3%) had upper aerodigestive tract emergencies. Out of 128 patients that were studied, majority (59.4%) were males. The age group of 0-17 years comprised about two third (60.9%) of the study population, followed by the age group of 46-65 years (17.9%) and (18 – 45) years (16.4%). The elderly population of more than 65 years old comprised the minority 6(4.8%). Nearly half of all patients with UADTE that were attended during the study period came from other regions out of Mwanza. The median time from an insult to hospital presentation was 2(1-4) days. Among all patients, majority (63.3%) presented with dysphagia, followed by difficulty in breathing (47.7%), odynophagia (43.8%), and hoarseness of voice (34.4%). These characteristics are illustrated in Table 1.

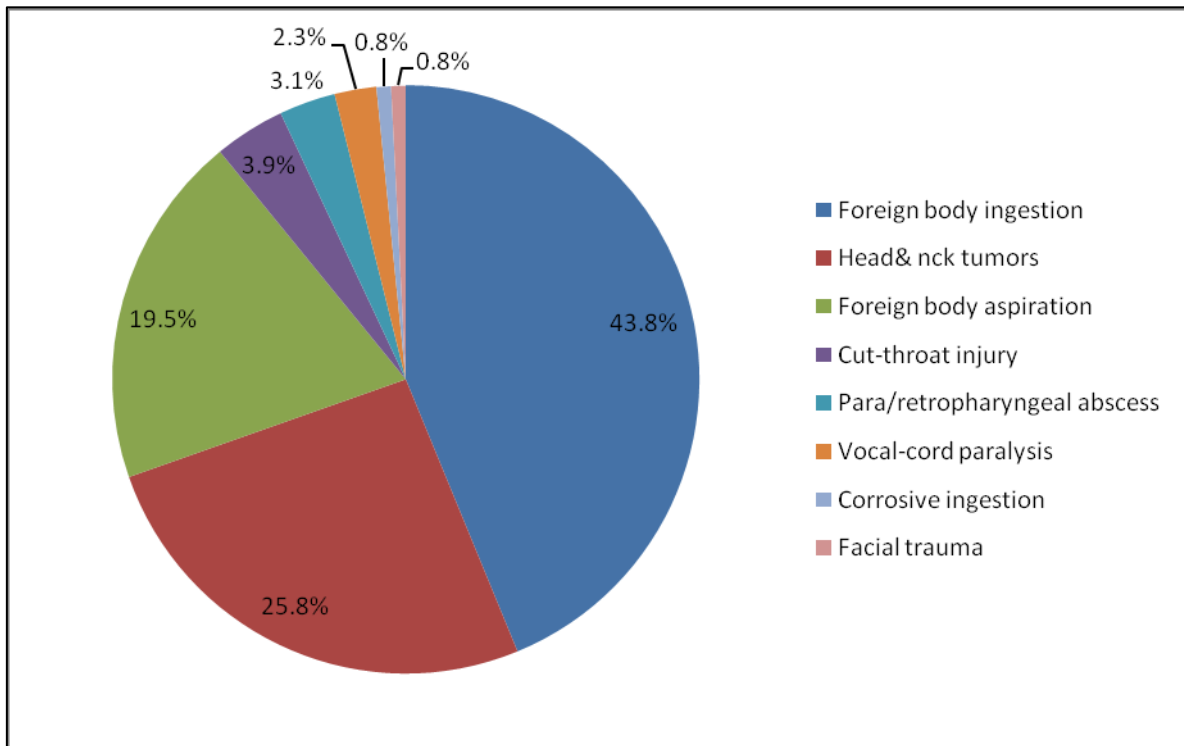
**Table 1: Baseline demographic and presenting characteristics of 128 patients with UADTEs**

Baseline Characteristic	Categories	Number(%)/Media(IQR)
Sex	Male	76 (59.4)
	Female	52(40.6)
Age years)		5(2-40)
Age groups	0-17	78(60.9)
	18-45	21(16.4)
	46-65	23(17.9)
	>65	6(4.8)
Residence	Mwanza city	49(38.6)
	Mwanza region	18(14.2)
	Outside Mwanza region	60(47.2)
Duration of UADTEs to treatment (days)		2 (1-4)
Attending doctor	Resident	123(96.1)
	Surgeon	5(3.9)
Presenting features	Dysphagia	81(63.3)
	Difficulty in breathing	61(47.7)
	Odynophagia	56(43.8)
	Hoarseness of voice	44(34.4)
	Laceration of anterior Neck	6(4.5)

**Etiologies of UADTE**

The common etiologies of UADTE among attended patients were foreign body ingestion, head & neck tumors and foreign body aspiration that were seen

in 56(43.8%), 33(25.8%) and 25(19.5%) patients respectively. Corrosive ingestion and facial trauma were the least causes of UADTE that were each seen in 1(0.8%) patient (Figure 1).

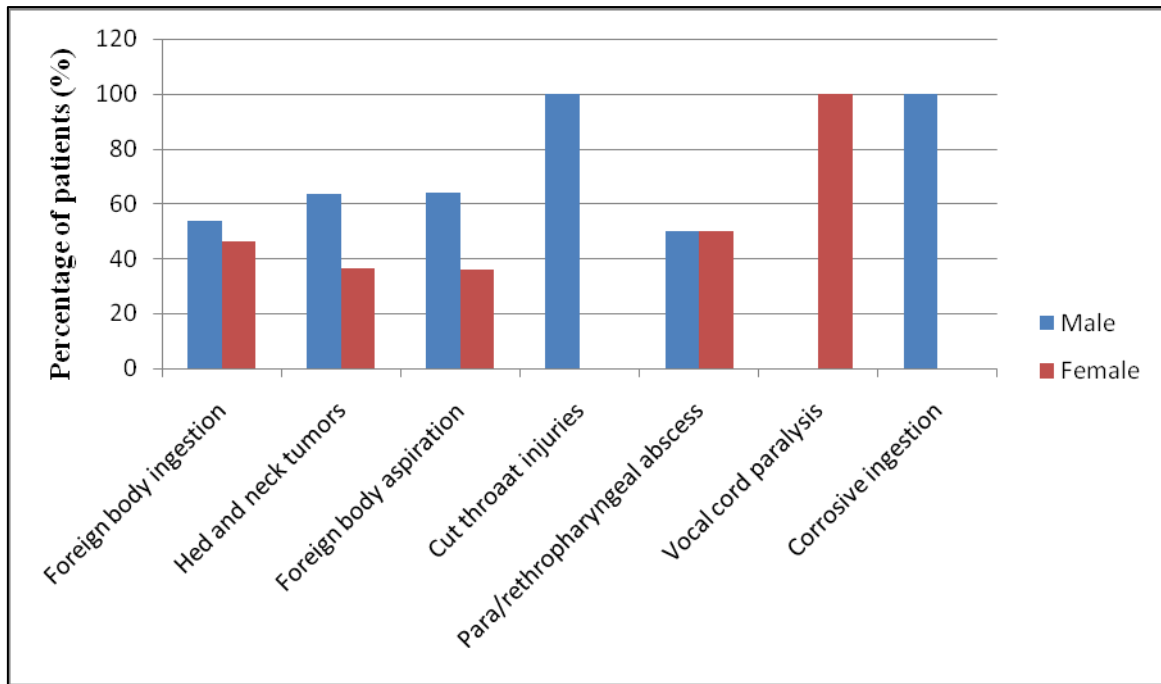


**Figure 1: Causes of UDTEs**

**UADTEs distribution according to gender**

The gender distribution of causes of UADTEs has been shown in Figure 2. Cut-throat injury and corrosive ingestion were exclusively seen in male patients while vocal cord paralysis was only presented in

female patients. Generally, male patients were predominant group in most of the UADTE etiologies compare to their female counterparts. These include FB aspiration (64% vs. 36%), Head & neck tumors (63.6% vs. 36.4%) and FB ingestion (53.6% vs. 46.4%).

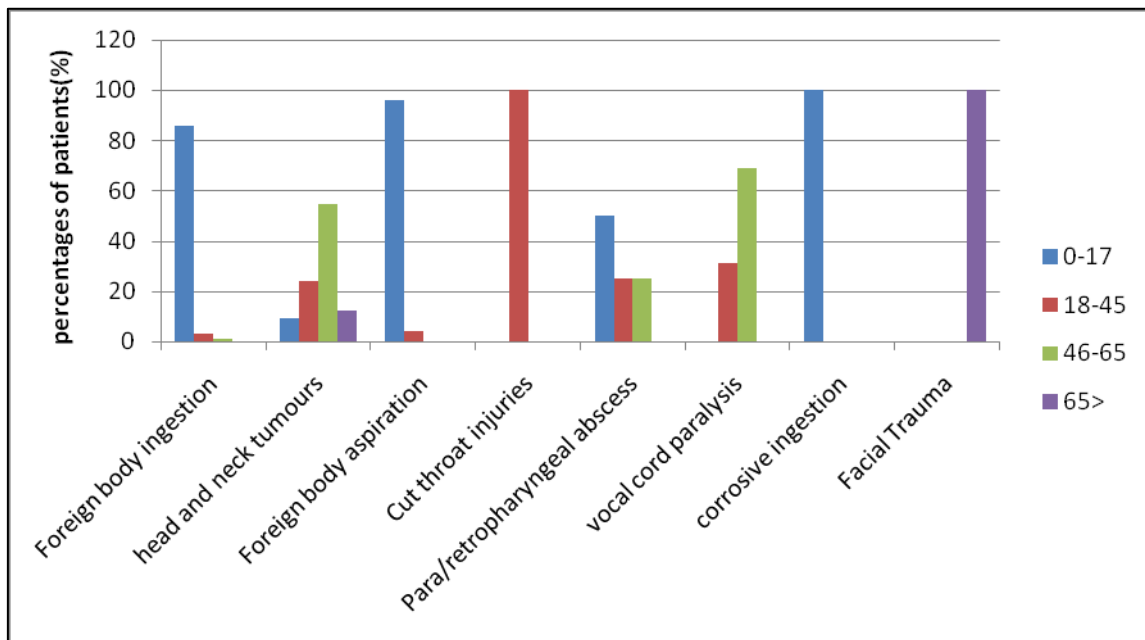


**Figure 2: Distribution of types of UADTEs according to gender**

**UADTEs distribution according to age group categories**

The younger age group of 0-17years comprised the majority of patients with FB aspiration, FB ingestion and Para/retropharyngeal abscess in 96%, 85.7% and 50% respectively. Among patients with FBI and FBA, the second most common age group was that of 18 -45 years, which occurred in 10.7% and 4% respectively.

Head & neck tumors were found to be commonly presented among the middle age group of 46-65 years in 54.6% followed by youth (18-45years) which was presented in 24.2% of patients. This condition was rarely presented among the elderly (>65 years) and younger age groups (0-17 years) in 12.1% and 9.1% respectively Figure 3.



**Figure 3: Distribution of UADTEs according to age**

**The pattern of clinical presentations in patients with FB ingestion**

A combination of dysphagia+ odynophagia was the most commonly presented in 36/56(64.3%) of

patients with FB ingestion, followed by dysphagia alone, that was seen in 11/56 (19.6%) patients. Other features have been illustrated in Table 2.

**Table 2: Pattern of clinical presentation among 56 patients with foreign body ingestion**

Clinical presentation	Number (n=56)	Percentage (%)
<b>One characteristic</b>		
Dysphagia	11	19.6
Odynophagia	1	1.8
DIB	1	1.8
<b>Two characteristics</b>		
Dysphagia+ odynophagia	36	64.3
<b>Three characteristics</b>		
Dysphagia+ odynophagia+ DIB	2	3.6
Dysphagia+ odynophagia+ Hoarseness of voice	1	1.8
Dysphagia+ DIB+ Hoarseness of voice	3	5.3
Odynophagia+ DIB+ hoarseness of voice	1	1.8

**The pattern of clinical presentations of patients with Head and neck tumors**

DIB, hoarseness of voice and dysphagia was the most frequent presentation combination among the patients with head and neck tumors, which was seen in

15/33(45.5%) subjects, followed by the combination of difficulty in breathing and hoarseness of voice in 5/33(15.2%) patients. Other presentations pattern has been illustrated in Table 3.

**Table 3: Pattern of clinical presentation among 33 patients with head& neck tumors**

Clinical presentation	Number (n=33)	Percentage (%)
<b>One characteristic</b>		
DIB	2	6.1
Hoarseness of voice	2	6.1
<b>Two characteristics</b>		
DIB+ Hoarseness of voice	5	15.2
Dysphagia+ odynophagia	3	9.1
<b>Three characteristics</b>		
DIB+ Hoarseness of voice+ dysphagia	15	45.5
DIB+ dysphagia+ odynophagia	2	6.1
Hoarseness of voice+ dysphagia+ odynophagia	4	12.1

**The pattern of clinical presentations among patients with foreign body aspiration**

In patients who had FBA, majority of them 13/25(52.0%) presented with DIB alone, followed by a

combination of DIB+ hoarseness of voice in 9/25(36.0%) patients. Other patterns of presentation in this group have been illustrated in Table 4.

**Table 4: Pattern of clinical presentation among 25 patients with foreign body aspiration**

Clinical presentation	Number (n=25)	Percentage (%)
<b>One characteristic</b>		
DIB	13	52.0
Hoarseness of voice	1	4.0
<b>Two characteristics</b>		
DIB+ Hoarseness of voice	9	36.0
DIB+ fever	1	4.0
<b>Three characteristics</b>		
DIB+ Hoarseness of voice+ dysphagia	1	4.0

**The pattern of clinical presentation among patients with Para/retropharyngeal abscess, vocal cord paralysis, corrosive ingestion and facial trauma**

Among 4 patients with P/RA, one patient presented with fever only, two presented with fever+ odynophagia, and one presented with both fever+ DIB and odynophagia. A total of 3 patients in this study, were found to have vocal cord paralysis as an etiology of UADTE. Among these, 2 patients presented with both,

DIB and hoarseness of voice and 1 presented with DIB only.

One patient that had corrosive ingestion, presented with dysphagia only, and the other one with facial trauma, presented with dysphagia, odynophagia & laceration of anterior neck.

### Factors associated with poor clinical outcomes of UADTEs treatment

#### Esophagoscopy

Out of 58 patients who underwent esophagoscopy, a total of 5 (8.6%) patients developed poor outcomes. These included perforation in 2/5(40%), esophageal stenosis in 2/5 (40%) and other injury in 1/5 (20%). The younger age group (0-17 years) compared to others, was significantly associated with poor outcomes

following Esophagoscopy ( $p=0.02$ ). Also, the increased duration before the commencement of treatment from the time of insult was significantly associated with increased rate of poor outcomes [7(4-21) Vs. 2(1-3) days,  $p=0.04$ ]. Moreover, among patients that underwent Esophagoscopy, a lower saturation of oxygen [96(95-96)] % compared to [98(96-98)] % was also found to be highly associated with adverse outcomes, Table 5.

**Table 5: Factors associated with poor outcome among 58 patients who underwent esophagoscopy**

Variable	Poor outcomes		P value
	Yes (n=5)	No (n=53)	
<b>Sex</b>			1.00
Male	3(60.0)	28(52.8)	
Female	2(40.0)	25(47.2)	
<b>Age groups</b>			
0-17	1(20.0)	41(77.4)	<b>0.02</b>
18-45	3(60.0)	7(13.2)	<b>0.03</b>
46-65	1(20.0)	5(9.4)	0.43
>65	0	0	
<b>Residence:</b>			
Mwanza city	1(20.0)	25(47.2)	0.37
Mwanza region	2(40.0)	6(11.3)	0.14
Outside Mwanza region	2(40)	21(39.6)	1.00
Duration from onset to treatment (days)	7(4-21)	2(1-3)	<b>0.04*</b>
<b>Attending doctor</b>			0.24
Resident	4(80.0)	51(96.2)	
Surgeon	1(20.0)	2(3.8)	
<b>Presenting features</b>			
Dysphagia	4(80)	1(20)	0.24
Difficulty in breathing	1(20)	4(80)	0.43
Odynophagia	4(80)	1(20)	1.00
SPO2	96 (95-96)	98(96-98)	<b>0.04*</b>

#### Tracheostomy

A total of 35 patients underwent tracheostomy, where majority 29/35 (82.9%) of them presented with head and neck tumors as the main etiology of UADTE. Out of these patients, 10/35(28.5%) had at least one poor outcome from the procedure. Four patients (40%)

developed post-OP infection, 4/10(40%) developed tracheal stenosis, 2/10(10%) developed post-OP bleeding and 1/10(10%) had perforation. None of the factors was associated with poor outcome in this group of patients Table 6.

**Table 6: Factors associated with poor outcome among 35 patients who underwent Tracheostomy.**

Variable	Poor outcomes		P value
	Yes (n=10)	No (n=25)	
<b>Sex</b>			
Male	8 (80.0)	14(56.0)	0.26
Female	2 (20.0)	11(44.0)	
<b>Age group</b>			
0-17	0	3(12.0)	0.54
18-45	2(20.0)	8(32.0)	0.67
46-65	7(70.0)	10(40.0)	0.15
>65	1(10.0)	4(16.0)	1.00
<b>Residence</b>			
Mwanza city	3(30.0)	9(36.0)	1.00
Mwanza region	3(30.0)	2(8.0)	0.13
Outside Mwanza region	4(40.0)	14(56.0)	0.47
Duration from onset to treatment (days)	1.5 (15.0)	3(2-6)	0.08

Variable	Poor outcomes		P value
	Yes (n=10)	No (n=25)	
<b>Attending doctor</b>			
Resident	10(100)	22(88.0)	0.54
Surgeon	0	3(12.0)	
<b>Etiology of UADTE</b>			
Head & neck tumors	7(70.0)	22(88.0)	0.32
Cut throat injuries	2 (20.0)	1(4.0)	0.19
Vocal cord paralysis	1(10.0)	2(8.0)	1.00
<b>Presenting features</b>			
Difficulty in breathing	7(70.0)	22(88.0)	0.32
SPO2 (%)	93.5(90-95)	94(90-95)	0.94
Variables were compared by Fisher's exact test			

### Bronchoscopy

During the study period, 32/128 (25.0%) patients underwent bronchoscopy, and out of these, 7(21.9%) patients had poor outcomes, which included; Electrolyte imbalance 7(100%), Infection 2(28.6%), and

perforation 1(14.3%). By using fishers exact test, none of the presenting features was found to be associated with poor outcomes among patients that underwent Bronchoscopy, Table 7.

**Table 7: Factors associated with poor outcome of 7 patients among 32 who underwent bronchoscopy**

Variable	Poor outcomes		P value
	Yes (n=7)	No (n=25)	
<b>Sex</b>			
Male	5(71.4)	16(64.0)	
Female	2(28.6)	9(36.0)	
<b>Age groups</b>			
0-17	7(100)	23(92.0)	1.00
18-45	0	1(4.00)	1.00
46-65	0	1(4.00)	1.00
>65	0	0	
<b>Residence:</b>			
Mwanza city	1(14.3)	8(32.0)	1.00
Mwanza region	1(12.0)	0	1.00
Outside Mwanza region	5(71.4)	13(52.0)	0.43
Duration of onset of UADEs to treatment(days)	3(2-7)	2(2-3)	0.14
<b>Attending doctor</b>			
Resident	7(100)	25(100)	*
Surgeon	0	0	
<b>Presenting features</b>			
Dysphagia	2(28.6)	5(20)	0.63
Difficulty in breathing	5(71.4)	22(88)	0.29
SPO2	93(88-95)	94(90-95)	0.46
Variables were compared by Fisher's exact test			

The factors associated with outcomes for other treatment modalities (thoracotomy, cut-throat repair, surgical debridement, and I&D) could not be established due to small number of patients. For instance, thoracotomy was performed in one patients, a 2-year-old girl, who was seen in the hospital day 7 post ingestion of the foreign body, and died in the same day of admission.

Cut-throat repair was done in 3 patients, who presented with cut-throat injuries. Among them, 2(66.7%) developed post-op bleeding and 1(33.3%)

developed a perforation. Among the bleeders, one patient also had post-op infection.

### Univariate analysis on the predictors of prolonged length of hospital stays among all admitted patients.

In this study, the total length of hospital stay ranged from 1 to 15 days, with the median (IQR) of 2.5 (1-11) days. When factors that were associated with long hospital stay (>3 days) vs. short stay ( $\leq$  3days) were compared, the age groups of 16-45 years [(24.6 vs. 9.9),  $p<0.03$ ] and 46-65 years [(35.1 vs. 4.2),  $p<0.001$ ] were found to have significantly higher duration of hosp stay



respectively. Moreover, a significant proportion (85.9%) of the younger age group (0-15 years) were found to have significantly short duration of hospital stay ( $3 \leq$  days) compared to those with high stay duration (29.8%), ( $p < 0.001$ ). An increased hospital stay duration in this study, was also found to be strongly associated with late presentation to the hospital ( $> 2$  days after the insult) in 38 (66.7%) patients compared to early presentation ( $\leq 2$  days) in 22 (30.9%), ( $p < 0.001$ ). Furthermore, several

clinical presentations were found to be highly associated with increased hospital stay duration, which include dysphagia ( $p = 0.003$ ), odynophagia ( $p = 0.01$ ), difficulty in breathing ( $p < 0.001$ ) and hoarseness of voice ( $p < 0.001$ ). Of the etiologies of UADTE, foreign body ingestion was the only significantly factor that was associated with short duration of hospital stay in 53 (74.6%) patients that stayed for 3 days or less and 3 (5.3%) patients that stayed for  $> 3$  days ( $p < 0.001$ ) Table 8.

**Table 8: Predictors of prolonged hospital stay among all 128 patients by univariate analysis**

Variable	Hospital stay (days)		Odds Ratio (95% CI)	P value
	$> 3$ (n=57)	$\leq 3$ (n=71)		
<b>Demographics</b>				
Sex			0.89(0.44-1.82)	0.76
Male	33(57.9)	43(60.6)		
Female	24(42.1)	28(39.4)		
<b>Age groups (years)</b>				
0-17	17(29.8)	61(85.9)	0.07(0.03-0.17)	$< 0.001$
18-45	1(24.6)	7(9.9)	2.97(1.11-7.98)	0.03
46-65	20(35.1)	3(4.2)	12.25(3.41-43.97)	$< 0.001$
$> 65$	6 (10.5)	0		
<b>Residence:</b>				
Mwanza city	16(28.1)	32(45.1)	0.48(0.22-1.00)	0.05
Mwanza region	9(15.8)	9(12.7)	1.29(0.48-3.50)	0.62
Outside Mwanza region	32(56.1)	28(39.4)	1.97(0.96-3.98)	0.06
			4.45(2.11-9.39)	$< 0.001$
<b>Duration of onset of UADEs to treatment (days)</b>				
$\leq 2$	19(33.3)	49(69.0)		
$> 2$	38(66.7)	22(30.9)		
<b>Attending doctor</b>				
Resident	54(94.7)	69(97.2)	1.92(0.31-11.88)	0.49
Surgeon	3(5.3)	2(2.8)		
<b>Presenting features</b>				
Dysphagia	28(49.1)	53(74.7)	0.33(0.16-0.69)	0.003
Odynophagia	18(31.6)	38(53.5)	0.40(0.19-0.83)	0.01
Difficulty in breathing	40(70.2)	21(29.6)	5.60(2.61-12.01)	$< 0.001$
Fever	4(7.0)	1(1.4)	5.28(0.57-48.65)	0.14
Hoarseness of voice	31(54.4)	13(18.3)	5.32(2.40-11.79)	$< 0.001$
<b>Low hemoglobin</b>				
$< 13$	13(22.8)	39(54.9)	0.24(0.11-0.53)	$< 0.001$
$\geq 13$	44(77.1)	32(45.1)		
<b>Etiology of UADTE</b>				
Foreign body ingestion	3(5.3)	53(74.6)	0.02(0.005-0.07)	$< 0.001$
Foreign body aspiration	9(15.8)	16(22.5)	0.64(0.26-1.59)	0.34
Head & neck tumors	33(57.9)	0		
Cut-throat injuries	5(8.8)	0		
Para/retro sternal abscess	4(7.1)	0		
Vocal cord paralysis	2(3.5)	1(1.4)	2.54(0.22-28.8)	0.45
Facial trauma	1(1.8)	0		
Corrosive ingestion	0	1(1.4)		

#### 4.8 Multivariate analysis on predictors of prolonged length of hospital stays among all admitted patients.

In multivariate analysis, the only predictor for prolonged hospital stay was late presentation to the

hospital [OR 4.82(1.35-17.16),  $p = 0.01$ ]. However, foreign body ingestion, as a cause of UADTE, was found to be a strong predictor for short hospital stay [OR .009 (.005-.14),  $p < 0.001$ ] Table 9.

**Table 9: Predictors of prolonged hospital stay among all 128 patients by multivariate analysis**

Variable	Odds Ratio (95% CI)	P value
<b>Age group:</b>		
0-17		0.99
18-45		0.99
46-65		0.99
<b>Residence:</b>		
Mwanza city	1.73(0.23-12.8)	0.59
Outside Mwanza region	4.55(0.59-34.99)	0.15
Duration of the onset of UADEs to treatment (days)	<b>4.82(1.35-17.16)</b>	<b>0.01</b>
<b>Presentation:</b>		
Dysphagia	1.78(0.24-13.10)	0.67
Odynophagia	1.69(0.15-19.02)	0.57
DIB	0.80(0.11-5.79)	0.83
Hoarseness of voice	0.62(0.14-2.73)	0.53
Low HB	0.45 (0.11-1.86)	0.27
Etiology of UADTE: Foreign body ingestion	<b>0.011(.0007-.16)</b>	<b>0.001</b>

## DISCUSSION

In this study, the prevalence of UADTEs among all ENT emergencies at BMC during the study period was 26.3%. This figure is higher than 4.9% and 3.1% that were reported in California (Vassiliu *et al.*, 2001) and Nigeria (Onotai & Ibegwe., 2012) respectively. These differences in the prevalence of UADTEs in these studies reflect differences in the prevalence of risk factors for developing UADTEs among different study settings. The author could not establish the reasons for the high prevalence of UADTEs in this study.

Upper aerodigestive tract emergencies can occur in all age groups (Onotai & Ibegwe., 2012). In the present study, the pediatric age group of 0-17 years comprised about two third of the study population. Similar age distribution has been reported in other studies (Sunil & Achal, 1999; Khan & Arif, 2005; Sogebi *et al.*, 2006; Onotai & Ibegwe., 2012). There was no obvious explanation for the high prevalence of UADEs in this age group; however, this can be explained by the fact that this is an active age group engaging in high-risk activities which predispose them to UADEs. In this study, male patients were more affected than females. The male preponderance in this study agrees with what was reported elsewhere (Sunil & Achal., 1999; Kitcher *et al.*, 2007). However, some other researchers found equal male to female ratio (Bleach *et al.*, 1994). The reasons for the male preponderance in our series may be attributed to the overactive nature of males as compared to their female counterparts.

The prevalence of different etiologies of UADTE varies considerably worldwide. In one study from Nigeria for instance, it was reported that epistaxis was the most frequent emergency that was presented in the ENT emergency department in 16.1% followed by nasal/facial trauma in 14.7%, pharyngo-esophageal foreign bodies in 13.3% and airway obstruction in 8.1% (Shraga *et al.*, 1980). Another Nigerian study that involved more than 5000 patients, reported that foreign

body aspiration/ingestion or insertion were the commonest causes of UADTE in 41.7% of the patients (Adedeji *et al.*, 2015) A previous study done at BMC to assess the causes of ENT injuries, showed that foreign bodies in the throat was the most frequent etiology (18.0%) which was followed by foreign bodies in the nasal pharynx in 8.8% (Gilyoma & Chalya., 2013). In the present study, foreign body ingestion was the most common etiology of UADTEs followed by head & neck tumors. These findings suggest that there might be higher prevalence of these tumors in our setting and most of them probably presents in late stages where the patient is already having the severe UADTEs symptoms. The pathological patterns of these tumors were beyond the scope of this study, but our findings have raised an important area of focus for further studies. In previous studies, male subjects have been reported to outnumber their female counterparts in presentation of cut-throat injuries, and corrosive ingestion. In India, more than eighty percent of patients with cut-throat injuries were males in their third and fourth decade of life (Chakraborty *et al.*, 2017). Likewise, in Nigerian study it was reported that all patients (100%) that were admitted with cut-throat injuries were males and the commonest age group was 30-35 years (Onotai & Ibegwe., 2010). Gilyoma *et al.*, (2014) also reported similar findings in Mwanza Tanzania, where male subjects with cut-throat injuries outnumbered the females by 2.4:1 and the median age was 26 years. The commonest reasons that were reported were suicidal attempts and accidental injuries. The reason as to why males at their youth are more susceptible to cut-throat injuries than females is probably due to the nature their work that is related to risk environment and curiosity. Sex predilection on corrosive ingestion is variable. Other studies have reported male's predominance (Hashmi *et al.*, 2018) while other reported female's predominance (Swain *et al.*, 2016). In the current study, only one male patient presented with corrosive ingestion hence difficult to comment on that.

Clinical presentations in patients with UADE depend on the etiologies. For example a study done in India shows that the most common presentation in patients with head and neck tumors was hoarseness of the voice with difficulty in breathing (Swarma *et al.*, 2013). Another study conducted in Nigeria, the most common clinical presentations seen in patients with UADTEs were difficulty in breathing, odynophagia and dysphagia (Onotai & Ibegwe., 2012). In Tanzania a study done by Gilyoma *et al.*, (2011) showed that the most common presentations were dysphagia and difficulty in breathing. In the current study, the most common clinical presentations are difficulty in breathing, odynophagia, dysphagia and hoarseness of the voice.

The modality of treatment of UADTEs depends upon the etiological factors (Onotai & Ibegwe., 2012). Endoscopic removal of foreign bodies in the aerodigestive tract using rigid scopes under general anesthesia has been reported to be a golden standard procedure (Gilyoma & Chalya., 2011). In the present study, rigid endoscopy (oesophagoscopy and bronchoscopy) with aerodigestive foreign bodies removal under general anesthesia, cut throat repair and surgical wound debridement ± tracheostomy were the most common treatment modalities performed. This treatment pattern was also reported elsewhere by others (Onotai & Ibegwe., 2012; Gilyoma & Chalya., 2013).

The presence of complications has an impact on the final outcome of patients presenting with UADTEs as supported by the present study (Onotai & Ibegwe., 2012; Gilyoma & Chalya., 2013). In our study, complications following esophagoscopy included esophageal perforation and esophageal stenosis. The pattern of complications in the present study is similar to what was reported by others (Onotai & Ibegwe., 2012; Gilyoma & Chalya., 2013). In a previous study which was done in China among the 519 patients who underwent rigid esophagoscopy, the major complications developed included esophageal perforations and retropharyngeal abscess (Lam *et al.*, 2003). Also, one study that was done in Nigeria revealed that the commonest complication encountered following esophagoscopy was esophageal stenosis due to prolonged impacted foreign body in the esophagus. In another study done by Gilyoma *et al.*, (2011) among 98 patients that underwent esophagoscopy, complication rate was 7.1% and bronchial pneumonia was the commonest. In current study, the younger age group (0-17 years) had significantly associated with poor outcomes following esophagoscopy. Moreover, increased duration before the intervention of treatment from the time of insult was significantly associated with increased rate of poor outcomes. Nevertheless, among patients that underwent esophagoscopy, a lower saturation of oxygen was highly associated with adverse outcomes.

Previous study done in India encountered the complications of tracheostomy done to 100 patients to be hemorrhage of 3 patients, 12 patients had infections around the stoma, 7 patients had tracheostomy tube obstruction and displacement in 2 patients. These results did not have any association with poor outcome (Mehta & Chamyal., 1999). Another study done in Nigeria stated the complications of tracheostomy to be Tracheal stenosis, subcutaneous emphysema and bleeding. This study did not show an association of the poor outcome with the complications seen (Alabi *et al.*, 2018). In the present study, post-tracheostomy developed included post-operative infection, tracheal stenosis, post-operative bleeding and perforation. None of the factors was associated with poor outcome.

In a previous study done by Li *et al.*, (2020) in China, preoperative pulmonary disease, need for lung assistance, history of ineffective rigid bronchoscopy and prolonged length of bronchoscopy more than 30 minutes were associated with postoperative poor outcome. In the current study, 25.0% of patients who underwent bronchoscopy, 7 patients had poor outcomes, which included; Electrolyte imbalance, Infection and perforation. None of the presenting features had associated with poor outcomes. A study done in China by Li *et al.*, (2020), stated that prolonged duration between the assault of the UADTEs to treatment was the major predictor of prolonged length of hospital stay. Another study done by Zhang *et al.*, (2017) showed the predictors of prolonged length of hospital stay to patients with UADTEs to be prolonged duration of the incidence >24 hours to time of intervention. In the current study by multivariate analysis, the only predictor for prolonged length of hospital stay was late presentation to the hospital from the onset of UADTEs. However, foreign body ingestion, as a cause of UADTE, was found to be a strong predictor for short hospital stay. This could be explained by less complications encountered pre and post management of foreign body in the esophagus.

In conclusion, the commonest etiologies of UADEs are foreign body ingestion, laryngeal tumors and foreign body aspiration respectively. Delayed onset to definitive treatment was the major predictor of poor outcome and prolonged length of hospital stay. Young age group was associated with more complications like perforations, electrolyte imbalances, infections and prolonged length of hospital stay than adults. Since most of UADTEs are often carried out by otolaryngologists, it is therefore recommended that more otolaryngologist are needed for better services. In addition, more training is needed to emergency physicians to be able to manage emergencies in upper aerodigestive tracts to reduce morbidity and mortality at our setting and in the country at large.

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