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by SAHIL KATARIA

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Untitled

Since its description in 1790 by Hunter, the nasogastric tube (NGT) is commonly used in any healthcare setting for alleviating gastrointestinal symptoms or enteral feeding. However, the risks associated with its placement are often underestimated. Upper airway obstruction with a NGT is an uncommon but potentially life-threatening complication. NGT syndrome (NGTS) was first described in 1939, a syndrome characterised by the presence of an NGT, throat pain and vocal cord paralysis, usually bilateral. It is potentially life–threatening, and early diagnosis is the key to the prevention of fatal upper airway obstruction.

However, fewer cases may have been reported than might have occurred, primarily due to the clinicians' unawareness. The lack of specific signs and symptoms and the inability to prove temporal relation with NGT insertion has made diagnosing the syndrome quite challenging. Thus, we decided to review and collate the data from the published case reports and case series to understand the possible risk factors, early warning signs and symptoms for timely detection to prevent the manifestation of the complete syndrome with life-threatening airway obstruction.

KEYWORDS:
Nasogastric tube; Nasogastric tube syndrome; NG tube; Ryle's tube; Sofferman syndrome; Vocal cord paralysis

CORE TIP

Nasogastric tube (NGT) insertion is a commonly employed procedure in hospitalised patients. Although it is considered a minor and safe procedure, complications may occur due to its invasive nature. Immediate complications while NGT insertion may be easily recognised, but long-term complications may be missed and are rarely reported. Most of the complications are minor and can be rapidly detected, but rarely, life-threatening complications like NGT syndrome have also been reported. NGT syndrome has been described decades ago, but till now, very few adult cases have been reported in the literature. Timely recognition and a simple intervention of NGT removal may be life-saving, and most patients may show complete recovery. However, a significant proportion of these patients may require tracheostomy for airway protection until the vocal cord palsy recovers.

INTRODUCTION

Nasogastric tube (NGT) insertion is a common procedure for hospitalised patients. Although NGT insertion is considered a simple procedure, it may lead to complications because of its invasive nature. Elderly, critically ill and those with underlying comorbidities may be prone to develop these complications, but these are the patients who may also benefit the most from NGT insertion. The commonly reported complications of NGT include malposition, knotting or coiling of the tube, and local trauma or bleeding.[1,2] Most of these complications occur during NGT insertion and are generally mild and easily recognised. Severe complications like oesophageal rupture have also been reported. In patients with long-standing NGT tubes, ulceration or necrosis of nasal alar, epistaxis, congestion, rhinosinusitis, and acute otitis media have also been reported.[2-4] Other complications associated with NGT include impaired lower oesophageal sphincter function, leading to increased

gastroesophageal reflux (GER) and aspiration pneumonitis.[2] However, certain long-term complications associated with NGT, like the NGT syndrome, may be challenging to recognise and rarely reported (Tables 1 and 2).[5-22]

The NGT syndrome is a serious and potentially life-threatening complication of NGT insertion. Even though the first description of this syndrome was in a case series of 12 patients published by Iglauer in 1939,[23] the term NGT syndrome was coined by Sofferman in 1990.[6] They described NGT syndrome as the development of throat pain and abductor dysfunction of vocal cords (VC) secondary to the presence of the NGT. It is suspected to result from ulceration and necrosis of the posterior cricoid region, leading to VC abduction paralysis.[6]

The exact cause of NGT syndrome remains unknown. However, multiple mechanisms have been postulated, a combination of which may lead to the development of NGT syndrome. The first reason could be the dynamic and delicate larynx being constantly irritated by the semi-rigid NGT when the patient swallows or coughs. Secondly, the tonic contractile cricopharyngeus muscle continually presses the NGT against the posterior cricoid cartilage lamina, forming pressure ulcers. Thirdly, gravity pulls the larynx posteriorly in a supine patient, causing the NGT to be stuck between the rigid cricoid cartilage and the anterior cervical spine.[5] Finally, another proposed mechanism is the ischemia secondary to the compression of blood vessels supplying the posterior cricoarytenoid muscle by the NGT.[11] All these may lead to NGT causing persistent pressure, trauma and irritation on the posterior cricoid lamina, leading to ischemic necrosis, ulceration, and infection. This infection and necrosis of the posterior cricoid cartilage affect the function of the

posterior cricoarytenoid muscles, which in turn affects the capacity of the larynx to abduct the vocal cords, leading to respiratory compromise.[5,11]

Diagnosis of NGT syndrome may be missed because of lack of awareness, non-specific symptomatology and delayed presentation after NGT insertion. Hence, only a few cases have been reported in the literature. Through this meta-summary, we intend to review and collate the available case reports and series data to understand the possible risk factors, signs and symptoms, and the clinical course of patients with NGT syndrome.

MATERIAL AND METHODS

We conducted a systematic search for this meta-summary from the database of PubMed from all the past studies till August 2023. The search terms included major MESH terms "Nasogastric tube", "Intubation, Gastrointestinal", "Vocal Cord Paralysis", and Syndrome. Further, it was filtered for the case reports published in the English language and on adult (> 18 years) humans. We manually screened all the search results and included the relevant literature for NGT syndrome. Duplicate articles from different search databases were excluded manually (Figure 1).

All the case reports and case series were evaluated, and the data were extracted for patient demographics, clinical symptomatology, diagnostic and therapeutic interventions, clinical course and outcomes. A datasheet for evaluation was further prepared.

Data Analysis

We prepared and evaluated the datasheet with the help of Excel and Microsoft Office 2019. Categorical variables were presented as frequency and

percentage. Mean [standard deviation (SD)] or median [interquartile range (IQR)] was used for continuous variables as appropriate. We applied a non-parametric correlational statistical test to test the non-parametric statistical hypothesis as found appropriate. A p-value of <0.05 was deemed significant. Unless otherwise indicated, all the statistical analyses were done using SPSS (version 25.0, IBM SPSS Inc., Chicago, IL, USA). Tabulation and final documentation were done using MS Office software (MS Office 2019, Microsoft Corp, WA, USA).

RESULTS

Twenty-seven cases, from five case series and 13 case reports, of NGT syndrome were retrieved from our search, and published in literature till Aug 2023.[6-22] There was male predominance (17, 62.96%), and a maximum number of cases was reported from the USA (10, 37.04%) and Japan (7, 25.93%). The age at presentation ranged from 28 to 86 years, with 22 (81.48%) aged 60 years or above. The median reported age was 73 years (interquartile range, IQR 61.5-77.0). Ten patients had diabetes mellitus (37.04%), and nine were hypertensive (33.33%). Other commonly reported comorbidities included chronic kidney disease (2, 7.4%), parkinsonism (2, 7.4%) and coronary artery disease (1, 3.7%). Only three (11.11%) patients were reported to be immunocompromised. The median time for developing symptoms after NGT insertion was 14.5 days (IQR 6.25-33.75 days).

The most commonly reported reason for NGT insertion was neurological (acute stroke (10, 37.01%), Perioperative insertion (7, 25.93%) and altered mental status (3, 11.11%). The most commonly reported symptoms were stridor or wheezing 17 (62.96%), throat pain (7, 25.9%) and breathlessness (4, 14.8%). In

21, 77.78% of cases, bilateral VC were affected but in 3 patients (11.1%), only unilateral involvement was reported.

The only treatment instituted in most patients (21, 77.78%) was removing the NG tube. However, few patients were also treated with systemic (7, 25.9%) or inhaled (4, 14.8%) steroids. Most patients (17, 62.96%) required tracheostomy for airway protection. But 8 of the 23 survivors recovered within five weeks and could be decannulated. Three patients (11.11%) were reported to have died (table 3).

DISCUSSION

The present review included data from 27 reported cases with a diagnosis of NGT syndrome published in the last decades. More than 80% of patients were aged 60 years and above, and 37.04% were reported to be diabetics. There was considerable heterogeneity in the timing of the onset of symptoms from NGT insertion (ranging 2 days to 2 years). In most of the patients, the only intervention required was NGT removal. Even though 62.96% required tracheostomy for airway protection, most showed complete recovery, with 8 (34.78%) patients of 23 survivors getting tracheostomy decannulation within five weeks.

NGT syndrome is a rare but potentially life-threatening complication of NGT insertion. The incidence of NGT syndrome may be much higher than reported, and the diagnosis is primarily missed, as many patients may have minor symptoms or be misdiagnosed. Further, many patients requiring NGT are too sick to report any symptoms, so the diagnosis largely depends on the suspicion of treating physicians. Wolff et al. evaluated the larynges of 149 patients by performing a post-mortem, who had had NGT in situ for more than 48 hours and reported that 35% had post-cricoid ulcers present.[24] This suggests that in

critically ill patients requiring NGT for more than 48 hours, the incidence may be much higher, warranting a high index of suspicion in such patients.

The non-specific symptoms of NGT syndrome are frequently missed or attributed to other common diseases like asthma or infection. Throat pain has been described as an important and early presenting complaint and is a component of the classical triad defined by Sofferman et al.[6] However, critically ill patients or those with altered mental status may not be able to complain of pain, and hence, the diagnosis may be missed or delayed. In our review, throat pain was reported in only 7 (25.93%) patients, and stridor was the most common symptom in almost 17, 62.96% of patients. As most of these patients had neurological dysfunction or were critically ill, throat pain might not have been reported. Hence, stridor or wheezing in a patient with NGT should alert the treating physician to the possibility of NGT syndrome. Symptoms like breathlessness, desaturation or respiratory distress develop late and are suggestive of advanced disease requiring prompt medical intervention. If early signs are missed, patients with NGT syndrome may present with life-threatening respiratory distress, which may require emergency tracheostomy to maintain the airway.

The presence of comorbidities may also affect the incidence of NGT syndrome. Diabetes Mellitus has been reported to increase the risk of developing NGT syndrome, which was also said to be present in 10 (37.01%) of cases in our review.[6] The other reported risk factors include gastroesophageal reflux (GER) leading to an acidic environment in the post-cricoid region and the presence of NGT at the level of the lower oesophageal sphincter, which may reduce its function.[25]

Classically, NGT syndrome has been described to affect both the VC.[6] However, as the awareness regarding this syndrome increased over the years, multiple unilateral varieties of NGT syndrome have been described.[8,9,22] Three patients (11.11%) in our review had only unilateral VC involvement. Symptoms of NGT syndrome have been shown to develop even two days after NGT insertion [2] but may be delayed up to two years. [11] This heterogeneity in presentation and lack of predictability make the diagnosis more challenging. Diagnosis of NGT syndrome requires direct visualisation of the VC and the post-cricoid area. Culture or biopsy may not be necessary for the diagnosis but may help rule out any secondary infection and institute appropriate antibiotics. As the diagnosis requires an invasive procedure, patients with minor symptoms like sore throat and hoarseness of voice may not warrant such a procedure and may be missed.

The only treatment instituted in most patients (73.9%) was removing the NG tube. Oral ingestion of food should be avoided as it may lead to aspiration due to VC palsy. Re-insertion of a softer NGT of a smaller size has also been shown to prevent the development of NGT syndrome. [17] Although NGT syndrome has been reported even with smaller size tubes, the effect of size remains to be discovered because most of the cases of NGT syndrome did not mention the size of NGT used. [22]. Although it seems prudent to use a smaller and softer NGT, if the patient's condition allows, it may prevent the development of NGT syndrome.

Even though inhaled or intravenous steroids were used in some patients, their role remains debatable. However, it may be instrumental in reducing inflammation and may provide early symptomatic relief in patients with severe symptoms. However, the risk of secondary infections must be considered while prescribing corticosteroids in critically ill patients. Hence, if used,

corticosteroids should be for a short duration and considered risk-benefit in patients with severe airway obstruction.

Complications of NGT syndrome include acute respiratory failure and the formation of retro-cricoid abscesses. Airway compromise secondary to VC palsy may necessitate tracheostomy for maintaining the airway. The presence of an endotracheal tube may prevent VC healing. Hence, tracheostomy may be preferred in such patients. The tracheostomy tube should be removed only after the resolution of VC palsy, which occurs in most cases between a few weeks to months. In our review, although most patients required tracheostomy, they could be successfully decannulated over the next few weeks.

There are several strengths to our analysis. We have included all the published cases of NGT syndrome to date. As we selected only adult cases, the data collected is more homogenous and applicable to adult healthcare. This being a meta-summary of case series and case reports, it has some inherent limitations. The data was collected from case series and case reports; thus, there was no control arm; studies were heterogeneous and prone to high risk of bias and missing data. This may affect the generalisability of the results.

CONCLUSIONS

NGT syndrome is an uncommon clinical complication of a very common clinical procedure. However, an underreporting is possible because of misdiagnosis or lack of awareness among clinicians. Patients in early stages and with mild symptoms may be missed. Further, high variability in the presentation timing after NGT insertion makes diagnosis challenging. Hence, a high index of suspicion is warranted to make a diagnosis. Early diagnosis and prompt removal of NGT may suffice in most patients, but a significant proportion of

patients presenting with respiratory compromise may require tracheostomy for airway protection. The long-term outcomes remain favourable, with the complete resolution of symptoms in most cases.