

DETECTION OF COMPLICATIONS ASSOCIATED WITH NASOGASTRIC TUBE FEEDING IN PATIENTS WITH HAEMORRHAGIC STROKE IN A TERTIARY HOSPITAL

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ABSTRACT

Background: Stroke poses the greatest disease burden in hospital admission among the non communicable diseases (NCD's). In majority of cases haemorrhagic stroke is the common neurological problem. Many of the patients develop swallowing difficulty and require nasogastric feeding for maintenance of nutrition. But this feeding can be a double-edged sword as it can lead to many complications due to various factors including errors in the feeding method, dislodgement of the tube and many other causes. Our intention was to look into this neglected part of clinical practice as this is mostly handled by internists.

Objectives: To evaluate the complications of nasogastric tube feeding practice on haemorrhagic stroke patients.

Materials and methods: One hundred (100) adult patients aged between 18- 70 years with haemorrhagic strokes enrolled in the study. Haemorrhagic stroke was diagnosed by the clinical presentation, neuroimaging (CT scan/ MRI). Patients requiring nasogastric tube feeding were included in the study. They were systematically examined for any complications related to use of nasogastric tube. Their caregivers were also thoroughly interviewed using a standard pre formed questionnaire regarding any complications as well. All data were collected by using a preformed data sheet and results were presented in standard method after statistical analysis.

Results: Of the 100 patients studied, most common age group for stroke was 51-60 years (53%). Male to female ratio was 2.22:1. In this study population, 70% had intracerebral haemorrhage, 24% had sub arachnoid haemorrhage and 6% had aneurysmal haemorrhage. The most common indication for NG feeding was difficulty in swallowing (39%). Other common indications were semi consciousness (26%), unconsciousness (22%), inability to maintain feed (10%). Around 71 % of the patients had complications from NG tube feeding. Out of them, 53% of the patients had nasal irritation where 63.15% was suffering from intracerebral haemorrhage, 31.57% and 5.26% were suffering from subarachnoid haemorrhagic and aneurysmal haemorrhage respectively. 40 % patients developed aspiration pneumonia, out of them 65.51% was intracerebral haemorrhage, 31.03% was subarachnoid haemorrhage, 3.44% was aneurysmal haemorrhage. 38% of the patients were developed diarrhea. Diarrhoea was reported by 66.66%, 29.62%, 3.70% in intracerebral haemorrhage, subarachnoid haemorrhage and aneurysmal haemorrhage respectively. 53% had tube blockage, out of them intracerebral haemorrhage 71.05%, subarachnoid haemorrhage 23.68%, aneurysmal haemorrhage 2.63%. 43% of the patients had electrolyte imbalance, among them intracerebral haemorrhage 67.74% and subarachnoid haemorrhage 32.25%. Tube displacement was experienced by intracerebral haemorrhage 74.16%, subarachnoid haemorrhage 25.80% and 18% of the patients were malnourished.

Conclusion: NG tube feeding is an integral part of management of stroke patients with feeding difficulties. But often it is associated with various complications which can increase the morbidities in stroke patients.

Key words: Nasogastric tube feeding, Haemorrhagic stroke, Complications of NG tube feeding.

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Introduction:

Dysphagia occurs in up to 50% of patients admitted to hospital with hemispheric stroke.¹⁻⁴ Up to 27% remain at risk of aspiration by seven days, and up to 8% have swallowing problems six months after their stroke with 1.7% still requiring tube feeding.^{5,6} Nutritional supplementations can reduce mortality in older people at risk of malnutrition, although this has not been shown specifically in the context of stroke.⁷ During the period when patients with stroke are unable to take their full dietary requirements normally the delivery of a liquid feed through a fine bore nasogastric tube is commonly used. The tube is usually secured with adhesive tape around the tube and to the patients face, and is often hooked behind the ear. Unfortunately, nasogastric tubes may be dislodged, due to confusion, restlessness, communication and attention disorders during handling or normal movement. Partial dislodgement may leave the tube misplaced in the lungs, leading to a risk of aspiration. Dislodgement means that the tube needs to be positioned, possibly causing distress and discomfort to the patient. Re-sitting takes up nursing staff time, and may require a chest x-ray to confirm that the tip of the tube is in the stomach (especially in the light of recent guidance, adding further costs and inconvenience.⁸ With multiple re-sittings, and the associated delays, the amount of food that is delivered by conventional nasogastric tube may be significantly below the intended amount.^{9,10} This gives rise to a risk of malnutrition, which is associated with poor outcomes.¹¹⁻¹³ Among the top causes of admission in the year 2010 who get admitted to various hospitals in Bangladesh including Dhaka Medical College Hospital (DMCH), haemorrhagic stroke make a bulk of the patients.¹⁴ Many of them required nasogastric tube feeding due to dysphagia. Though, this form of feeding is done mostly by nursing staffs in developed countries, but in our country, it is done solely by patient's attendants due to shortage of manpower in public hospitals. Unfortunately, most of them cannot comply with standard practice due lack of education, hospital setting, and many other causes which may lead to adverse hospital outcome of this group of patients due to the complications.

Nasopharyngeal discomfort occurs frequently in patients with nasogastric tubes and many

suffer sore mouths, thirst, swallowing difficulties, and hoarseness.¹⁵ Short term oesophageal damage can include oesophagitis and ulceration from local abrasion and gastro-oesophageal reflux, occurring in up to 12.5% of neurological patients.¹⁶ Nausea occurs in 10–20% of patients and abdominal bloating and cramps from delayed gastric emptying are also common.^{15,17,18} Diarrhoea occurs in up to 30% of enterally fed patients on medical and surgical wards and more than 60% of patients on intensive care units. It can create serious problems from nutrient, fluid, and electrolyte losses, and from infected pressure sores and general patient distress.¹⁸⁻²² Aspiration may occur with no obvious vomiting or coughing, and pneumonia can develop silently. Tube can easily be blocked as well.¹⁵

Methodology of the Study

This cross-sectional study was conducted from April 2012 to September 2012 in the Department of Medicine at Dhaka Medical College Hospital, Dhaka. A total 100 Adult patients aged between 18-70 years of both sexes diagnosed with stroke having a nasogastric tube feeding were included. The study was done by purposive type non probability sampling technique. After getting Institutional review board approval subjects were selected on the basis of enrollment criteria. Written informed consent was taken from all patients.

Study procedure:

The diagnosis of stroke was established by the clinical presentation, neuroimaging (CT scan/MRI). Patients requiring nasogastric tube feeding was included in the study. They were thoroughly examined for any complications from possible use of nasogastric tube. Their caregivers were also thoroughly interviewed using a standard pre formed questionnaire regarding any complications as well.

Semi-structured questionnaires were formed that include all the variables of interest. This questionnaire was used for collection of information by interviewing patients. The questions were designed to elicit details of the use of nasogastric feeding, its associated complications and possible underlying factors of these complications. The maximum time to take an interview was 1 hour. Data collection was consisting of interviews, medical history, physical examination, consultation records and completion of specific protocol.

Patients were explained about the procedure. Tube was marked at a distance equal to that from the xiphisternum to the nose via the earlobe (50–60 cm). Tube was lubricated externally with gel/water. Nasal patency was checked by “sniff” with each nostril occluded in turn. The clearer nostril could be sprayed with lignocaine to avoid discomfort. Patients were sited upright with the head level. Tube was slid gently backwards along the floor of the clearer nostril until visible at the back of the pharynx (10–15 cm). Patients were asked to take a mouthful of water and then advance the tube 5–10 cm as they swallow in cooperative cases. Water swallow/advance was repeated until the preset mark on the tube reaches the nostril. Tube was withdrawn at any stage who were distressed, coughing, or cyanosed. When there was difficulty passing the tube, patients were asked to tilt their head forwards or turn it to one side. Once in place, position of the tube was checked before use.

Position of a tube was checked by injecting air through it and listening for bubble with a stethoscope or by an X-ray. Tube insertion was documented in the patient’s notes. Fine bore 5–8 French gauge NG tubes were used.

Administration of 200–400 ml of feeds was given through feeding tube over 15–60 minutes at regular intervals. Bolus feeding could be performed using a 50 ml syringe, either with or without the plunger. Nasogastric tube insertion related complications were assessed.

Ethical assurances:

No data or any information was collected without permission of the participant. Participation in this study were fully voluntary. The respondents were remaining entirely free to withdraw their participation at any time of the study. Written informed consent was taken from each patient. Prior to consent they were explained the aim and purpose of the study. Confidentiality was assured and anonymity was maintained; no participants were identified in any report or publication under this study

Data processing & analysis:

Computer based statistical analysis was carried out with appropriate techniques and systems. After collection of information, these data were

checked, verified for consistency and edited where necessary. After editing and coding, the coded data were entered directly into the computer by using SPSS/PC software. Data cleaning validation and analysis were performed using the SPSS/PC software and graph and chart by MS excel. The results were presented in tables and graphs.

Results

Table-I

Socio-demographic characteristics of the study subject (n=100)

Characteristics	No of patients	Percentage
Age (in years)		
< 40	4	4%
51-60	53	53%
61-70	38	38%
>70	5	5%
Sex		
Male	69	69%
Female	31	31%

Table-I showing socio demographic characteristics of the study subject, most of the population belonged to 51-60 years group (53%). 38% of the subjects belonged in the 61–70-year age group, 4% to the <40-years age group and 5% to the >70-year age group. 69% of the population is male and 31% is female.

Table - II

Distribution of Different Types of haemorrhagic stroke(n-100)

Characteristics	No of Patients	Percent
Types of haemorrhagic stroke		
Intracerebral haemorrhage	70	70%
Subarachnoid hamorroge	24	24%
Aneurysmal hemorrhage	6	6%

Table-II Showing among the haemorrhagic stroke, Intracerebral haemorrhage 70%, Subarachnoid haemorroge 24%, Aneurysmal hemorrhage 6%.

Table III
Distribution of haemorrhagic stroke with different risk factors (n=100)

Risk Factors	Intracerebral haemorrhage	Subarachnoid Haemorrhage	Aneurysmal haemorrhage	p-value
HTN	52(74.28%)	18(75%)	2(33.33%)	0.093 ^{ns}
Smoking	42(60%)	15(62.50%)	2(33.33%)	0.409 ^{ns}
Diabetes	34(48.57%)	8(33.33%)	1(16.66%)	0.173 ^{ns}
Dyslipidaemia	28(40%)	6(25%)	1(16.66%)	0.257 ^{ns}
IHD	18(25.71%)	6(25%)	0(0%)	0.364 ^{ns}
Previous H/O TIA, CVD	9(12.85%)	9(37.5%)	2(33.33%)	0.023 ^s
Drugs (OCP)	5(7.14%)	4(16.66%)	0(0%)	0.271 ^{ns}

s=significant; ns=not significant; p-value reached from Chi-square test

Table-III showing among the intracerebral haemorrhage, hypertension (74.28%), smoking (60%), diabetes (48.57%) were the most common risk factors. Among the subarachnoid haemorrhage, hypertension (75%), smoking (62.5%) were the important risk factors. Aneurysmal haemorrhage is less common.

Previous H/O TIA, CVD factor was significantly ($p < 0.05$) associated with types of haemorrhagic stroke. But other risk factors were not significantly ($p > 0.05$) associated with types of haemorrhagic stroke.

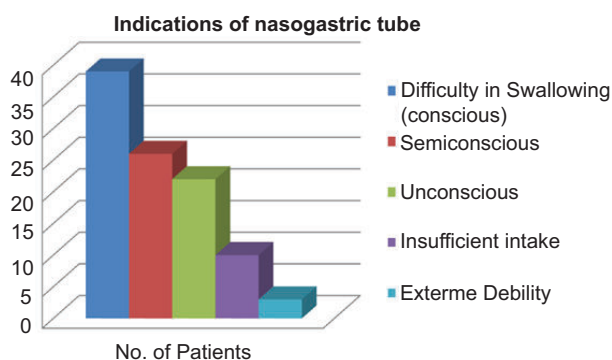


Fig. 1: Indications of use of nasogastric tube in haemorrhagic stroke patients

While evaluating the indications for nasogastric feeding, it was found that the most common indication was difficulty in swallowing (39%). The next common indication was altered consciousness. 26% of patients were given NG tube as they were semiconscious and 22% patients due to unconsciousness. 10% of

patients were unable to maintain their adequate feeding despite being able to eat orally and given NG tube. 3% patients were at the extreme of ages, unable to eat and so were given NG tube.

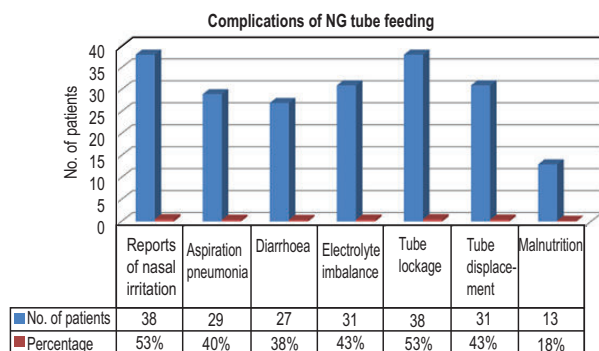


Fig. 2: Complications associated with nasogastric tube feeding (n=71)

Among the 100 patients studied, 71 had complications attributed to NG tube feeding. The most common complication was nasal irritation in patients who were (38). The second most common complication was aspiration pneumonia which was found in 29 of patients. Diarrhoea was found in 27 patients, electrolyte imbalance in 31 patients. 38 of the respondents complained of tube blockage some of which resulted in tube removal and reintroduction. 31 patients had tube displacement at some point of time. 13 patients were malnourished due to inadequate feeding. Some patients had more than one complication at the same time.

Table IV
Comparison between Complications and types of Haemorrhagic stroke (n=100)

Type of Complication	No of complications	Intracerebral haemorrhage	Subarachnoid Haemorrhage	Aneurysmal haemorrhage	p-value
Aspiration Pneumonia	29	19(65.51%)	9(31.03%)	1(3.44%)	0.495 ^{ns}
Nasal Irritation	38	24(63.15%)	12(31.57%)	2(5.26%)	0.380 ^{ns}
Diarrhoea	27	18(66.66%)	8(29.62%)	1(3.70%)	0.646 ^{ns}
Electrolyte Imbalance	31	21(67.74%)	10(32.25%)	0(0%)	0.135 ^{ns}
Tube Blockage	38	27(71.05%)	9(23.68%)	1(2.63%)	0.565 ^{ns}
Tube Displacement	31	23(74.16%)	8(25.80%)	0(0%)	0.238 ^{ns}
Malnutrition	13	8(61.53%)	4(30.76%)	1(7.69%)	0.775 ^{ns}

ns=not significant; p-value reached from Chi-square test

Table-IV: In comparison of the 29 patients who developed aspiration pneumonia, 19(65.51%) was suffering from intracerebral haemorrhage, 9 (31.03%) was suffering from subarachnoid haemorrhagic stroke. 1 (3.44%) was suffering from aneurysmal haemorrhage. Patients who reported nasal irritation, 24 (63.15%) was suffering from intracerebral haemorrhage, 12 (31.57%) and 2 (5.26%) was suffering from subarachnoid haemorrhagic and aneurysmal haemorrhage respectively. Diarrhoea was reported by 18 (66.66%), 8 (29.62%), 1 (3.70%) in intracerebral haemorrhage, subarachnoid haemorrhagic, aneurysmal haemorrhage respectively. Electrolyte imbalance was found in intracerebral haemorrhage 21 (67.74%) subarachnoid haemorrhagic 10(32.25%). Tube blockage was reported in intracerebral haemorrhage 27 (71.05%), subarachnoid haemorrhagic 9 (23.68%), aneurysmal haemorrhage 1 (2.63%). Tube displacement was experienced by intracerebral haemorrhage 23(74.16%), subarachnoid haemorrhagic 8 (25.80%) respectively. Malnutrition was also found in hemorrhagic stroke. Complications were not significantly ($p>0.05$) associated with types of haemorrhagic stroke.

Discussion

This cross-sectional study was carried out with an aim to evaluate the complications of nasogastric tube feeding practice on haemorrhagic stroke patients. A total 100 Adult patients aged between 18-70 years of both sexes

diagnosed with different types of haemorrhagic stroke who required NG tube for feeding purpose were included.

Among the age distribution, most population belonged to 51-60 years group (53%). 38% of the subjects belonged in the 61-70-year age group, 4% to the <40-year age group and 5% to the >70-year age group. In this study, 69% of the population was male and 31% is female. A study by AM Hussain et al. (2011) showed that Most of the patients suffering from haemorrhagic stroke were male (74%) and most of them were between 51-70 years of age (69%) which correlates to our study finding although another study done in DMCH among young stroke patients show slightly higher percentage (M: F 52:47) regarding sex distribution. This might be related to age of the subjects as many factors influence stroke in different age group.^{14,48} In my study among the haemorrhagic stroke, intracerebral haemorrhage 70%, subarachnoid haemorrhage 24% and aneurysmal bleeds in 6% was found which was study in DMCH describes incidence of hemorrhagic stroke to be 20%.

Higher rate of different types of haemorrhagic stroke including intracerebral haemorrhage, sub arachnoid haemorrhage and aneurysmal bleeds is also have been reported in number of hospitals in Asian countries such as Singapore, Malaysia (33%) Thailand (30%), Korea (31%), Taiwan (31%). One of the causes of high incidence of different types of haemorrhagic stroke in our hospital based present study may

be due to the acute admission is more related to haemorrhagic stroke, availability of neurosurgical intervention at DMCH and DMCH being a tertiary referral center.^{14,48}

Analysis of different risk factors revealed that hypertension was the most important risk factor of haemorrhagic stroke (74.28% in intracerebral haemorrhage, 75% in sub arachnoid haemorrhage and 33.33% in aneurysmal bleeds). Other important risk factors were smoking where 60%, 62.50% and 33.33% patients had intracerebral haemorrhage, sub arachnoid haemorrhage and aneurysmal bleeds respectively and diabetes mellitus where 48.57%, 33.33% and 16.66% patients had intracerebral haemorrhage, subarachnoid haemorrhage and aneurysmal bleeds respectively. Dyslipidaemia was found 40% in intracerebral haemorrhage, 25% in subarachnoid haemorrhage and 16.66% in aneurysmal bleeds. The association of hypertension is more with intracerebral haemorrhage and subarachnoid haemorrhage.

The result correlates with that of a study in India where hypertension was found to be the most important risk factor.⁵⁴ Two Bangladeshi studies by Siddique A N et al. (2009) and AM Hossain et al. (2011) also describes similar findings.^{48,53} Smoking appears as an important risk factor in hemorrhagic stroke (intracerebral haemorrhage and subarachnoid haemorrhage) in this study. This study correlates with Donnan et al. (1989) who found smoking as a strong risk factor for SAH.

In my study, out of 100 patients who required NG tube following stroke were selected as per the inclusion criteria. A study by Titu Miah et al. (2010) showed that as high as 78% of the stroke patients required NG tube feeding for stroke.⁶² Indications for NG tube feeding were analyzed in our study population. The most common indication for NG tube feeding was dysphagia (39%). It has been reported that dysphagia can occur up to 50% of patients following stroke.¹⁻⁴ In a study by Titu Miah et al. (2010) 24 % were fed via NG tube for dysphagia.⁶² In our study, 26% of the patients were semiconscious whereas 22% of the patients were unconscious following stroke. Two

Bangladeshi studies showed that alteration of consciousness is a common finding in stroke where they report it to be 54% and 59% respectively.^{49,53} Our study showed total 48% of the patients required NG tube feeding for alteration of consciousness which is comparable to the results of Titu Miah et al.⁶² We observed that 10% of the patients were given NG tube feeding due to poor intake and 3% for extreme debility. Patients who are capable of swallowing liquids and food may have a poor appetite because of the effects of intercurrent illness or medication and they may eat more slowly or be less keen to eat because of facial weakness, lack of dentures or poor arm function.⁶⁴ A Bangladeshi study reported this cause to be 22% which is comparable to our study.⁶²

Out the 100 patients studied, 71 patients had complications of different types of haemorrhagic stroke. Nasal irritation was reported by 53% of patients. Of the patients who reported nasal irritation, 63.15% was suffering from intracerebral haemorrhage 31.57% and 5.26% was suffering from subarachnoid haemorrhagic and aneurysmal haemorrhage respectively. To the best of our knowledge no study has been done in our country regarding the complications of NG tube feeding. Among the complications studied in western countries, following NG tube insertion, nasal irritation is one of the more common one and it is more prevalent in those requiring large bore ones.³¹⁻³⁵ In our study, it was a very common complication and was reported by the most respondents. A possible explanation is that the size of the NG tube commonly used in our hospital is wide bored which is more prone to cause nasal irritation.

The second most common complication was aspiration pneumonia in our patients which was found in 40% of patients. Out of the 29 patients who developed aspiration pneumonia, 65.51% was suffering from intracerebral haemorrhage, 31.03% was suffering from subarachnoid haemorrhagic stroke, 3.44% was suffering from aneurysmal haemorrhage. A western study found that up to 27% remain at risk of aspiration by seven days. Our results show a higher percentage. Possible reasons might be due to the fact that the whole feeding process

is done in our setting by untrained persons.⁵ Gastro-oesophageal reflux occurs frequently with NG tube feeding. It is more common when patients are NG fed in the supine position and reflects a combination of gravitational back flow and impairment of gastro-oesophageal sphincter function induced by pharyngeal stimulation and the presence of the tube across the cardia. It is very common in patients with impaired consciousness or poor gag reflexes, occurring in up to 30% of those with tracheostomies and 12.5% of neurological patients.^{16,65,66} Aspiration may occur with no obvious vomiting or coughing, and pneumonia can develop silently. To minimize risks of aspiration, patients should be fed propped up by 30° or more, and should be kept propped up for 30 minutes after feeding.¹⁵ Acid suppression or sucralfate may help with symptoms of oesophagitis, but they do not prevent aspiration pneumonia. When asked, most of the respondents replied that the patients were propped up during the feeding, but the duration for which they remained so was not consistent as most patients could not maintain the position due to lack of hospital facilities. These included bed structure (no back support available), some patients being in the floor due to lack of beds and another important reason being not adequate people all the time for maintenance of the posture.

Diarrhoea was found in 38% patients. Out of them 66.66%, 29.62%, 3.70% in intracerebral haemorrhage, subarachnoid haemorrhagic, aneurysmal haemorrhage respectively. NG tube feeding related diarrhoea occurs in up to 30% of enterally fed patients on medical and surgical wards and more than 60% of patients on intensive care units.¹⁸⁻²² In developed parts of the world, the food preparation technique, the food handling, the material of the food is of high quality. That might be the reason for the lower percentage reflected in their studies. Even then, the underlying causes for diarrhoea are food contamination, drugs, antibiotic associated diarrhoea.³⁰ In DMCH, the food preparation technique is difficult as patient's attendants are required to prepare the food, they rely solely on supply water for food and the environment is mostly contaminated.

Conclusion

The present study provides information regarding the various complications that arise as a result of NG tube feeding in haemorrhagic stroke patients. Stroke patients make up a bulk of hospital admission in tertiary hospitals and will continue to do so. NG tube feeding is an important part of managing the nutritional part of these patients. But unfortunately, it is neglected as well. This study highlights the fact that a very high percentage of NG tube fed patients developed various complications and ultimately lead to adverse hospital outcome.

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