



RELATIONSHIP BETWEEN GLASGOW COMA SCALE AND AIRWAYS PROTECTIVE REFLEXES IN CEREBRO VASCULAR ATTACK PATIENTS

Cardiology

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ABSTRACT

Introduction: The laryngeal cough reflex (LCR) protects the supraglottic larynx from significant aspiration of food or fluids during inspiration or pharyngeal spillage during swallowing. The reflex cough test (RCT), using nebulized tartaric acid solution, provides an effective stimulus to the receptors in the supraglottic mucosa, and, like a reflex hammer or percussor, triggers a cascade of neurological activity in both craniospinal nerves and the central nervous system. The vagus nerve mediates the afferent component of the LCR.

Aims And Objective: To find the relation between glasgowcoma scale and airway protective reflexes in Indian population.

Materials And Methods: This study was a prospective observational study. Clinical history and examination is mandatory for selection of the eligible patients. All the procedure was done, only once a traumatically, in patients. Suction apparatus was made available all the time beside the patients in case they vomit. Procedure was done under supervision of senior physician.

Result And Analysis: We found that in ≤ 5 GCS Group, 15(100.0%) patients had Intubation. In 6-8 GCS Group, 7(10.6%) patients had Intubation. In ≥ 9 GCS Group, 8(20.5%) patients had Intubation. Association of Intubation vs GCS Group was statistically significant ($p < 0.0001$). In ≤ 5 GCS Group, 15(100.0%) patients had Immediate Intubation.

Summary And Conclusion: In our study, 11(9.2%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective reflexes checked later, 19(15.8%) patients were Not Applicable (As Pt Mechanical Ventilator) air way protective reflexes checked later and 90(75.0%) patients were Patent (Present Cough and Gag reflex) air way protective reflexes checked later. Mechanical Ventilator was more in low GCS (≤ 5) which was statistically significant.

KEYWORDS

Glasgow Coma Scale, Airways Protective Reflexes And Cerebro Vascular

INTRODUCTION

The laryngeal cough reflex (LCR) protects the supraglottic larynx from significant aspiration of food or fluids during inspiration or pharyngeal spillage during swallowing¹. The reflex cough test (RCT), using nebulized tartaric acid solution, provides an effective stimulus to the receptors in the supraglottic mucosa, and, like a reflex hammer or percussor, triggers a cascade of neurological activity in both craniospinal nerves and the central nervous system. The vagus nerve mediates the afferent component of the LCR. Tartaric acid-induced cough stimulates rapid adapting receptors (RARs) in the supraglottic region of the larynx and sensory impulses are conveyed to the medulla via the middle ramus of the internal branch of the superior laryngeal nerve (ibSLN) and vagus nerve². The fibers of the ibSLN terminate on neurons near the nucleus tractus solitarius (NTS) of the medulla. The central connections of the reflex and voluntary cough circuits have been reviewed. Although the central connections of reflex cough are unclear, research suggests a rapid latency. Central processing of the cough reflex quickly sets off a cascade of synchronized central and peripheral responses involving the nucleus ambiguus, retroambigularis, phrenic nucleus, and medial motor cell column which project to the vagus, phrenic, intercostal and thoracoabdominal nerves, respectively.

Human studies have indicated the clinical implications of central and peripheral lesions of the cough system. The LCR may be impaired in individuals who have a transient (e.g., post-general anesthesia) or permanent (e.g., post-stroke, cervical cord trauma, Parkinson's disease, amyotrophic lateral sclerosis) neurological event, which may affect the afferent, central or efferent components of the LCR.

The Glasgow coma scale (GCS) was originally described in trauma patients and is a tool which allows standardized recording of a patient's level of consciousness. This has led to recommendations being made that in the setting of trauma, patients with a GCS of ≤ 8 should undergo tracheal intubation in order to prevent possible airway obstruction, aspiration or respiratory compromise leading to secondary brain injury.³ In the emergency setting clear guidelines are helpful for decision making, and a GCS of ≤ 8 has come to be commonly used as an indication for intubation in patients with reduced conscious level for any reason. The underlying assumption is that any patient who has a GCS of ≤ 8 is unable to protect their own airway and so is at risk of

aspiration, whereas any patient with a GCS of > 8 has intact airway reflexes and so is able to protect their own airway. Whilst there is little doubt that inability to protect the airway is an indication for intubation in the setting of critical illness or injury, there is currently a dearth of evidence verifying the relationship of the GCS, and in particular a cut-off of GCS ≤ 8 , to a patient's ability to protect their own airway. In a UK study conducted in 1992, Moulton and Pennycook examined the relationship of the GCS to airway reflexes in a population that mainly comprised patients with poisoning and head injury.⁴ They found that whilst GCS was strongly related to gag reflex, a number of patients with a GCS > 8 had a reduced or absent gag reflex, whilst a number with a GCS ≤ 8 had an intact gag reflex. They also examined the relationship between GCS and cough reflex and found that even at the lowest coma scores some patients had intact cough reflexes. Based on these findings they argued that some patients with high levels of consciousness may not be capable of protecting their own airways and be at risk of aspiration, whilst conversely, some patients might retain their airway reflexes even at low levels of consciousness and so require drugs for safe intubation. Two recent studies of clinical outcomes in poisoned patients with reduced conscious levels have suggested that many patients with a GCS ≤ 8 can be safely managed without intubation. In contrast to this, two studies of aspiration pneumonia in poisoned patients found that increased risk of aspiration was associated not only with GCS ≤ 8 but also with GCS < 15 . These studies add to the weight of evidence that the current common practice of using GCS ≤ 8 as a marker of a patient's ability to protect their own airway may be inappropriate and detrimental to some patients. Most of the research into the relationship of airway reflexes with GCS has concentrated on patients with alcohol intoxication, poisoning and head injury.⁵

To find the relation between glasgowcoma scale and airway protective reflexes in Indian population.

MATERIALS AND METHODS

- This study was a prospective observational study.
- Clinical history and examination is mandatory for selection of the eligible patients.
- All the procedure was done, only once a traumatically, in patients.
- Suction apparatus was made available all the time beside the patients in case they vomit.

- Procedure was done under supervision of senior physician.

METHODS:

for gag reflex stimulation, the posterior pharyngeal wall would be touched with a long cotton bud and the gag reflexes were noted based on three parameters 1) normal, 2) attenuated 3) absent. Similarly using aloft long suction catheter cough reflexes would be stimulated, only once and results would be recorded based of the three parameters 1) normal (vigorous coughing) 2) less or diminished coughing 3) absent .suction will be kept ready all the time.

We chose to divide GCS into below mentioned groups coma (using the traditional definition of GCS<8) impaired consciousness without coma (GCS 9-14) and a normal conscious level (GCS 15)

Inclusion Criteria

1. All the CVA patients from age above 18 years
2. All the patients with GCS <15

Exclusion Criteria

- 1) Patients of pediatric age group
- 2) Patients having GCS 15
- 3) Patients having history of oropharyngeal carcinoma
- 4) All patients found to be in cardiac arrest

RESULT AND ANALYSIS

In our study, 14(11.7%) patients were <50 years old, 33(27.5%) patients were 51-60 years old, 40(33.3%) patients were 61-70 years old, 21(17.5%) patients were 71-80 years old and 12(10.0%) patient were 81-90 years old. 34(28.3%) patients were Female and 86(71.7%) patient were male. 15(12.5%) patients were in ≤5 GCS Group, 66(55.0%) patients were in 6-8 GCS Group and 39(32.5%) patients were in ≥9 GCS Group. 30(25.0%) patients had Intubation. 11(9.2%) patients had Delayed Intubation and 19(15.8%) patients had Immediate Intubation. 120(100.0%) patients were air way protective reflexes checked. 19(15.8%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective on presentation and 101(84.2%) patients were Patent (Present Cough and Gag reflex) air way protective on presentation. 11(9.2%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective reflexes checked later, 19(15.8%) patients were Not Applicable (As Pt Mechanical Ventilator) air way protective reflexes checked later and 90(75.0%) patients were Patent (Present Cough and Gag reflex) air way protective reflexes checked later.

We found that in ≤5 GCS Group, 15(100.0%) patients had Intubation. In 6-8 GCS Group, 7(10.6%) patients had Intubation. In ≥9 GCS Group, 8(20.5%) patients had Intubation. Association of Intubation vs GCS Group was statistically significant ($p < 0.0001$). In ≤5 GCS Group, 15(100.0%) patients had Immediate Intubation. In 6-8 GCS Group, 5(7.6%) patients had Delayed Intubation and 2(3.0%) patients had Immediate Intubation. In ≥9 GCS Group, 6(15.4%) patients had Delayed Intubation and 2(5.1%) patients had Immediate Intubation. Association of Time of Intubation vs GCS Group was statistically significant ($p < 0.0001$). In ≤5 GCS Group, 15(100.0%) patients had air way protective reflexes checked. In 6-8 GCS Group, 66(100.0%) patients had air way protective reflexes checked. In ≥9 GCS Group, 39(100.0%) patients had air way protective reflexes checked. In ≤5 GCS Group, 15(100.0%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective on presentation. In 6-8 GCS Group, 2(3.0%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective on presentation and 64(97.0%) patients were Patent (Present Cough and Gag reflex) air way protective on presentation. In ≥9 GCS Group, 2(5.1%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective on presentation and 37(94.9%) patients were Patent (Present Cough and Gag reflex) air way protective on presentation. Association of air way protective reflexes on presentation vs GCS Group was statistically significant ($p < 0.0001$).

Our study showed that in ≤5 GCS Group, 15(100.0%) patients were Not Applicable (As Pt Mechanical Ventilator) air way protective reflexes checked later. In 6-8 GCS Group, 5(7.6%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective reflexes checked later, 2(3.0%) patients were Not Applicable (As Pt Mechanical Ventilator) air way protective reflexes checked later and 59(89.4%) patients were Patent (Present Cough and Gag reflex) air way protective reflexes checked later. In ≥9 GCS

Group, 6(15.4%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective reflexes checked later, 2(5.1%) patients were Not Applicable (As Pt Mechanical Ventilator) air way protective reflexes checked later and 31(79.5%) patients were Patent (Present Cough and Gag reflex) air way protective reflexes checked later. Association of air way protective reflexes checked later vs GCS Group was statistically significant ($p < 0.0001$).

DISCUSSION

This prospective observational study was done, only once a traumatically, in patients. Total 120 patients were present in this study. In our study, out of 120(100.0%) patients, 34(28.3%) patients were Female and 86(71.7%) patients were male. The mean Age (mean± s.d.) of patients was 64.4083± 11.4661 years.

LEITE KK et al ⁶(2019) indicated that patients who had anterior circulation infarct; had lower scores on the Glasgow Coma Scale (GCS ≤ 14 points); took longer to initiate swallowing rehabilitation; had longer hospital stays; made more use of alternative feeding methods; needed more sessions of swallowing rehabilitation to remove alternate feeding methods; took longer to return to oral feeding and had poorer outcomes (fewer individuals discharged from swallowing rehabilitation sessions and increased mortality).

Majumder P et al ⁷(2015) found that the worse cognitive outcome is often associated with more severe degree of TBI as measured by initial Glasgow Coma Scale (GCS) score. Present study compared the cognitive function of TBI patients having initial GCS score 9-10 with those having the initial GCS score 11-12. The assessment on Postgraduate Institute battery of brain dysfunction was conducted when the patients came for their follow-up visit at a tertiary health care facility between 6 months and 12 months of sustaining TBI. There was moderate degree of cognitive dysfunction in the group with initial GCS score of 9-10 and no dysfunction in the group with initial GCS score of 11-12. The initial GCS score of 10 may be critical to predict cognitive deficits among TBI patients during 6-12 months of recovery period.

Bhaskar S et al ⁸(2017) found that the Glasgow Coma Scale (GCS) was designed to objectively, easily, methodically evaluate the neurological status of patients with impaired consciousness especially after traumatic brain injury. The score is used to grade and plan treatment of patients with head injury. It can also be used to monitor neurological status of critically ill patients. There are three parameters used- eye opening, verbal response and best motor response with the score ranging from 3-15. The technique, interpretation and certain practical issues concerning the GCS are discussed.

Riachy M et al ⁹(2008) showed that risk ratios were; GCS at admission 0.8(0.14), ($p = 0.024$), APACHE II 1.11(0.11), ($p = 0.05$) and duration of mechanical ventilation 1.07(0.07), ($p = 0.046$). Linear coefficients were: type of CVA – haemorrhagic versus ischemic: -18.95(4.58) ($p = 0.007$), GCS at hospital admission: -6.83(1.08), ($p = 0.001$), and duration of hospital stay -0.38(0.14), ($p = 0.40$).

Most of the male patients [24(68.9%)] need Intubation compared to the female patients [6(20.0%)]. Association of Gender vs Intubation was not statistically significant ($p = 0.2421$). The mean GCS (mean± s.d.) of Intubation patients was 6.4333± 3.4609.

Out of 120(100.0%) patients, only 30(25.0%) patients were in intubation. In between them highest number of patients [19(15.8%)] need Immediate Intubation and 11(9.2%) patients need Delayed Intubation. Immediate Intubation was mostly needed for the patients of GCS Group ≤5 [15(100.0%)]. From the GCS Group 6-8, 5(7.6%) patients had Delayed Intubation and 2(3.0%) patients had Immediate Intubation and in GCS Group ≥9, 6(15.4%) patients had Delayed Intubation and 2(5.1%) patients had Immediate Intubation. Association of Time of Intubation vs GCS Group was statistically significant ($p < 0.0001$).

In GCS Group ≤5, all [15(100.0%)] patients need Intubation and In GCS Group 6-8, only 7(10.6%) patients need Intubation. Association of Intubation vs GCS Group was statistically significant ($p < 0.0001$).

Rotheray KR et al ¹⁰(2012) observed that a total of 208 patients were recruited. Reduced gag and cough reflexes were found to be significantly related to reduced GCS ($p = 0.014$ and 0.002 , respectively). Of 33 patients with a GCS ≤ 8, 12 (36.4%) had normal

gag reflexes and 8 (24.2%) had normal cough reflexes. 23/62 (37.1%) patients with a GCS of 9–14 had absent gag reflexes, and 27 (43.5%) had absent cough reflexes. In patients with a normal GCS, 22.1% (25/113) had absent gag reflexes and 25.7% (29) had absent cough reflexes.

SUMMARY AND CONCLUSION

- In our study, 15(12.5%) patients were in ≤ 5 GCS Group, 66(55.0%) patients were in 6-8 GCS Group and 39(32.5%) patients were in ≥ 9 GCS Group.
- In our study, 30(25.0%) patients had Intubation, 11(9.2%) patients had Delayed Intubation and 19(15.8%) patients had Immediate Intubation.
- Intubation was more required in higher age group which was statistically significant.
- Intubation was more in low GCS (≤ 5) which was statistically significant and Immediate Intubation was significantly associated with low GCS (≤ 5).
- It was found that 19(15.8%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective on presentation and 101(84.2%) patients were Patent (Present Cough and Gag reflex) air way protective on presentation.
- Air way protective reflexes on presentation attenuated/ Diminished was significantly associated with low GCS (≤ 5).
- In our study, 11(9.2%) patients were Attenuated/ Diminished (Absent Cough and Gag reflex) air way protective reflexes checked later, 19(15.8%) patients were Not Applicable (As Pt Mechanical Ventilator) air way protective reflexes checked later and 90(75.0%) patients were Patent (Present Cough and Gag reflex) air way protective reflexes checked later.
- Mechanical Ventilator was more in low GCS (≤ 5) which was statistically significant.

Table: Association between Intubation, Air way protective reflexes on presentation and Air way protective reflexes checked later : GCS Group

		≤ 5	6-8	≥ 9	TOTAL
Intubation	No	0	59	31	90
	Row %	0.0	65.6	34.4	100.0
	Col %	0.0	89.4	79.5	75.0
	Yes	15	7	8	30
	Row %	50.0	23.3	26.7	100.0
	Col %	100.0	10.6	20.5	25.0
Air way protective reflexes on presentation	TOTAL	15	66	39	120
	Row %	12.5	55.0	32.5	100.0
	Col %	100.0	100.0	100.0	100.0
	Attenuated/ Diminished (Absent Cough and Gag reflex)	15	2	2	19
	Row %	78.9	10.5	10.5	100.0
	Col %	100.0	3.0	5.1	15.8
Air way protective reflexes checked later	Patent (Present Cough and Gag reflex)	0	64	37	101
	Row %	0.0	63.4	36.6	100.0
	Col %	0.0	97.0	94.9	84.2
	TOTAL	15	66	39	120
	Row %	12.5	55.0	32.5	100.0
	Col %	100.0	100.0	100.0	100.0
Air way protective reflexes checked later	Attenuated/ Diminished (Absent Cough and Gag reflex)	0	5	6	11
	Row %	0.0	45.5	54.5	100.0
	Col %	0.0	7.6	15.4	9.2
	Not Applicable (As Pt Mechanical Ventilator)	15	2	2	19
	Row %	78.9	10.5	10.5	100.0
	Col %	100.0	3.0	5.1	15.8
Air way protective reflexes checked later	Patent (Present Cough and Gag reflex)	0	59	31	90
	Row %	0.0	65.6	34.4	100.0
	Col %	0.0	89.4	79.5	75.0

	TOTAL	15	66	39	120
	Row %	12.5	55.0	32.5	100.0
	Col %	100.0	100.0	100.0	100.0

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