

# Comparison of Upper Lip Bite Test (ULBT) with Mallampati Classification, Regarding Assessment of Difficult Intubation

SAJJAD DAR, MUHAMMAD SAYYAF KHAN, FARAZ IQBAL, TAHIR NAZEER, RIAZ HUSSAIN

## ABSTRACT

**Aim:** To compare the accuracy of upper lip bite test (ULBT) with Mallampati classification regarding assessment of difficult intubation.

**Study Design:** Cross sectional survey.

**Methods:** 910 patients undergoing elective surgical procedures requiring general anaesthesia were included in the study. Bio-data of all patients were noted and informed consent was taken. During pre-operative assessment first mallampati classification was noted, then ULBT was performed and grades of ULBT were noted and in operation theater after induction of general anaesthesia by direct laryngoscopy Cormack Lehane grading was noted.

**Results:** Results indicated that for mallampati classification sensitivity and specificity was 58.30% and 82.6% respectively and positive predictive value (PPV) and negative predictive value (NPV) was 19.1% and 81.0% respectively, with accuracy of 81%. For ULBT sensitivity and specificity was 23.30% and 99.1% respectively. PPV and NPV were 63.6% and 94.8% with accuracy of 94.1%.

**Conclusion:** ULBT method has high accuracy than Mallampati classification.

**Keywords:** Mallampati classification, ULBT, Laryngoscopy, Cormack Lehane classification.

## INTRODUCTION

Unanticipated difficult intubation is a major concern in field of anesthesiology. About 85% of mistakes results in irreversible cerebral damage and 30% deaths are associated with difficult airway<sup>1</sup>. Incidence of difficult airway is 1-18% in different studies<sup>2</sup>. With accurate method of prediction of difficult airway we can avoid the unnecessary maneuvers (e.g., awake intubation)<sup>3</sup>. Some common test are Mouth opening (Mallampati classification) Thyromental distance (TMD), Sternomental distance (SMD), horizontal length of mandible (HLM), inter-incisor gap (IIG)<sup>4,5</sup>. But most of methods have low positive predictive value, low sensitivity and specificity<sup>6</sup>. Upper lip bite test (ULBT) was introduced in 2003. It is a very simple test<sup>7,8</sup>. ULBT has 97% specificity and 55% sensitivity<sup>9</sup>. In ULBT grade I and II were thought to predict easy intubation and grade III is difficult intubation<sup>10</sup>.

## MATERIAL & METHODS

After the approval of study from hospital ethics committee 910 patients undergoing general anaesthesia for elective surgeries were selected. Patient's bio-data was noted. Informed consent was taken. During pre-operative assessment first mallampati classification was performed and class was noted then ULBT was performed and grade of

ULBT was noted. Then on operation table after induction of general anaesthesia direct laryngoscopy was performed and Cormack lehane grading was noted and grade III & IV was considered as difficult laryngoscopy.

The study was done in the Department of Anaesthesia Services Hospital Lahore and in this sampling technique was non-probability purposive sampling and for statistical analysis we used SPSS version 10 and P-value less than .05 considered significant.

## RESULTS

In the study calculated sample size was 910 cases. The age group was 20 year to 50 years. Females were 511(56.2%) and male were 399(43.8%).

Table 1: Age groups\* Sex Cross tabulation.

| Age Groups | Male       | Female     | Total      |
|------------|------------|------------|------------|
| 20-30      | 187(46.9%) | 169(33.1%) | 356(39.1%) |
| 31-40      | 100(25.1%) | 179(35%)   | 279(30.7%) |
| 41-50      | 112(28.1%) | 163(31.9%) | 275(30.2%) |
| Total      | 399        | 511        | 910        |

### Male

Minimum Age = 20 years  
Maximum Age = 50 years  
Mean Age = 33.95  
SD = 10.11

### Female

Minimum Age = 20 years  
Maximum Age = 50 years  
Mean Age = 36.38  
SD = 8.97

Table 2: Mallampati Classification Scores.

| Mallampati Class | Frequency | Percentage |
|------------------|-----------|------------|
| I                | 305       | 33.5       |
| II               | 422       | 46.4       |
| III              | 153       | 16.8       |
| IV               | 30        | 3.3        |

Department of Anaesthesiology, Services Hospital, Lahore  
Correspondence to Dr. Tahir Nazeer  
Email: drtahirnazeer@yahoo.com

Mallampati classification sensitivity and specificity was 58.30% and 82.6% respectively. PPV was 19.1% and NPV was 81% with accepted accuracy of 81%. For ULBT sensitivity and specificity was 23.30% and 99.1% respectively. PPV was 63.6% and NPV was 94.8% with accepted accuracy of 94.1%. This indicated that accuracy was high in case of ULBT method than Mallampati classification when results were compared with standard scoring method i.e., Cormack Lehane method (classification).

Table 3: Upper Lip Bite test Scores

| ULBT Grade | Frequency | Percentage |
|------------|-----------|------------|
| I          | 696       | 76.5       |
| II         | 192       | 21.1       |
| III        | 22        | 2.4        |

Table 4: Distribution of Cormack &amp; Lehane Scale Scores

| C & L Grade | Frequency | Percentage |
|-------------|-----------|------------|
| I           | 649       | 71.3       |
| II          | 201       | 22.1       |
| III         | 44        | 4.8        |
| IV          | 16        | 1.8        |

Table 5: Mallampati\* C &amp; L Cross tabulation

| Mallampati Grade | C & L Grade |            |           |          | Total |
|------------------|-------------|------------|-----------|----------|-------|
|                  | I           | II         | III       | IV       |       |
| I                | 258(84.6%)  | 43(14.1%)  | 3(1%)     | 1(0.3%)  | 305   |
| II               | 296(70.1%)  | 105(24.9%) | 16(3.8%)  | 5(1.2%)  | 422   |
| III              | 83(54.2%)   | 43(28.1%)  | 21(13.7%) | 6(3.9%)  | 153   |
| IV               | 12(40%)     | 10(33.3%)  | 4(13.3%)  | 4(13.3%) | 30    |
| Total            | 649(71.3)   | 201(22.1%) | 44(4.8%)  | 16(1.8%) | 910   |

Chi-Square Test = 103.593, Degree of Freedom = 9, P-value = 0.000

Table 6: ULBT\* C &amp; L Cross Tabulation

| ULBT Grade | C & L      |            |           |          | Total |
|------------|------------|------------|-----------|----------|-------|
|            | I          | II         | III       | IV       |       |
| I          | 570(81.9%) | 104(14.9%) | 14(2%)    | 8(1.1%)  | 696   |
| II         | 75(39.1%)  | 93(48.4%)  | 20(10.4%) | 4(2.1%)  | 192   |
| III        | 4(18.2%)   | 4(18.2%)   | 10(45.5%) | 4(18.2%) | 22    |
| Total      | 649(71.3%) | 201(22.1%) | 44(4.8%)  | 16(1.8%) | 910   |

Chi-Square Test = 258.485, Degree of Freedom = 6, P-value = 0.000

Table 7: Sensitivity &amp; Specificity for (Mallampati Vs C &amp; L)

| Mallampati          | C & L        |                   | Total |
|---------------------|--------------|-------------------|-------|
|                     | Easy (1 & 2) | Difficult (3 & 4) |       |
| Predicted Easy      | TN (702)     | FN (25)           | 727   |
| Predicted Difficult | FP (148)     | TP (35)           | 183   |
| Total               | 850          | 60                | 910   |

Sensitivity =  $TP / (TP+FN) = 35 / (35+25) = 58.30\%$ , Specificity =  $TN / (TN+FP) = 702 / (702+148) = 82.6\%$ , PPV =  $TP / (TP+FP) = 35 / (35+148) = 19.1\%$ , NPV =  $TN / (TN+FN) = 702 / (702+25) = 81.0\%$ , Accuracy =  $(TP+TN) / (N) = (35+702) / 910 = 81.0\%$

Table 8: Sensitivity &amp; Specificity for (ULBT Vs C &amp; L)

| ULBT                | C & L        |               | Total   |
|---------------------|--------------|---------------|---------|
|                     | Easy (1 & 2) | Difficult (3) |         |
| Predicted Easy      | TN (842)     | FN (46)       | 888     |
| Predicted Difficult | FP (8)       | TP (14)       | 22      |
| Total               | 850          | 60            | N = 910 |

Sensitivity =  $TP / (TP+FN) = 14 / (14+46) = 23.30\%$ , Specificity =  $TN / (TN+FP) = 842 / (842+8) = 99.1\%$ , PPV =  $TP / (TP+FP) = 14 / (14+8) = 63.6\%$ , NPV =  $TN / (TN+FN) = 842 / (842+46) = 94.8\%$ , Accuracy =  $(TP+TN) / (N) = (842+14) / 910 = 94.1\%$

## DISCUSSION

Endotracheal tube insertion is a basic thing in field of anaesthesiology<sup>5</sup>. In the history of anaesthesiology first elective tracheal tube was passed during anaesthesia was by Sir William MacEwen in Scotland in late nineteenth century, Joseph O' Dwyer in united states (USA) and in Germany by Franz Kuhn<sup>11</sup>. There is 1.5% to 13% incidence of difficult laryngoscopy and intubation. Many advances have been made and many times tested methods have been used for this problem.

ULBT was introduced by Khan et al in 2001<sup>12</sup>. It is a very simple test and it is a combination of Jaw

subluxation and buck teeth. It does not require any equipment. There is a limitation of ULBT in patient with no teeth (edentulous patients). The incidence of difficult intubation in our study was 6.6% i.e., 60 patients out of 910 patients. The incidence of difficult intubation in Khan's study was 5.7% where as in Leopold's study it was 12%<sup>13</sup>. Similarly sensitivity of Mallampate test was 58.3% in our study and it is slightly different from Khan's et al study which was 82.4% but our figure 58.3% is comparable with other study like Savva et al 64%<sup>14</sup>.

The specificity of Mallampati test noted in our study was 82.0% which was more than Khan's et al study 66.8% and also differ from Leopold et al 61.0%

but it is comparable with Oates et al study 82.0%<sup>15</sup>. A wide variation in specificity and sensitivity noted in different studies may be because of inter-observer variability and some incorrect evaluation and poor demarcation between the various classes of mallampati.

## CONLUCION

ULBT method has higher accuracy when compared with standard score method (Mallampati Classification) for the prediction of difficult intubation.

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