Comparison of TruView and King Vision video laryngoscopes in subaxial cervical spine injury: A randomized controlled trial

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INTRODUCTION

Manual in-line axial stabilization (MILS) is used for airway management where other stabilization methods are inappropriate.⁷ The TruView (TV) EV02 (TruView PCD™ 4150, Truphatek International Ltd., Netanya, Israel) is an optical laryngoscope that gives 42° deflection view through a 15 mm eyepiece; it provides wider angle of vision even in neutral position. The King Vision [10] (KV) video laryngoscope (KVL03C, King Systems Corporation, Germany)
ensures optimum quality images of the vocal cords, has two types of blades, and can accommodate an endotracheal tube between 6.0 and 8.5 mm ID [Figure 1].

This pilot study compared the safety/efficacy of tracheal intubation utilizing the TV and KV when combined with MILS in patients with subaxial cervical spine trauma [Figures 2 and 3].

MATERIALS AND METHODS

This was an IRB approved, randomized prospective, single-blind, comparative study conducted over a 3-year period (January 2017–December 2019) at tertiary care spinal injuries center [Figure 4]. All patients were analyzed by the same anesthetist who is also the lead author of this paper to ensure no bias. Demographic variables, airway assessment, and ASA grading were noted preoperatively. The study population included 60 patients of ASA I-III, aged 18–65 years undergoing subaxial cervical spine surgery under general anesthesia. [Table 1].

Anesthetic techniques

Routine induction was performed in both population groups. MILS was applied to hold the mastoid process and side of the neck in position preventing any movement (flexion, extension, or rotation) of the neck. After mask ventilation for 2 min, laryngoscopy and orotracheal intubation were performed by an experienced anesthetist (at least 5 years) utilizing the TV or KV instruments. All intubations were carried out with size 3 blade for both the laryngoscopes. The total duration of intubation was visually confirmed by the anesthetist, and successful tube placement was confirmed utilizing routine modalities (e.g., capnography/end-tidal CO₂). Complications during intubation including soft-tissue injuries were recorded.

Statistical analysis

The sample size was measured with the pooled standard deviation of IDS from the past studies as 2.75 and two-sample t-tests were applied using the formula \( (\mu_1 - \mu_2)/SD = 0.88 \). Using the following cutoff values of \( \alpha \) as 0.05 and \( \beta \) as 0.20 (or 80% power), a minimum required sample of 30 in each group was estimated. Quantitative variables (e.g., airway examination, IDS, number of attempts, and complications) were compared using Mann–Whitney test and Chi-square test. Hemodynamic alterations were compared using unpaired and paired t-tests. All results were analyzed using SPSS software version 23.0.

RESULTS

Our study included 60 subjects; 30 in either group, who had sustained subaxial cervical spine injuries resulting
in comparable preoperative neurological deficits [Tables 2 and 3]. Cases were classified into five age groups at 10-year intervals [Table 4]. They exhibited comparable variables regarding sex distribution, ASA presenting grades, and upper lip bite texts.

With MILS, patients in the KV group had statistically significant lower IDS (0.70 ± 1.02) and significantly shorter duration of intubation as compared to the TV group (1.67 ± 1.27) with MILS (p = 0.0010) [Table 5]. Notably, the glottic exposure was similar in both groups. The complication rate (e.g., soft-tissue injury) was lower for the KV group, but this

### Table 2: Level of injury in patients.

| Level | TV | KV |
|-------|----|----|
| C3    | 5  | 7  |
| C4    | 4  | 6  |
| C5    | 5  | 7  |
| C6    | 10 | 5  |
| C7    | 6  | 5  |

TV: TruView; KV: King Vision

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**Figure 3:** The King Vision video laryngoscope and Truphatek-TruView PCDTM laryngoscope.

**Figure 4:** Flowchart showing distribution of patient population.
was not statistically significant. Interestingly, no patient from either group exhibited increased neurological deterioration attributable to the method of intubation. The initial mean HR 1 min before intubation was higher in the KV group versus the TV group [Table 6]. The differences regarding increases in MAP with laryngoscopy and intubation were not statistically significant at each measured interval for the two groups [Table 7].

**DISCUSSION**

Managing airway with MILS is very difficult task for an anesthesiologist in patients with cervical spine injuries during resuscitation, administration of general anesthesia, and respiratory support. The TV laryngoscope and KV video laryngoscope are two indirect laryngoscopes each with an advanced optical technology.

Bhardwaj et al.[2] found less neck movement occurring during laryngoscopy utilizing the TV versus Macintosh laryngoscope. El Tahan et al.[5] concluded that laryngoscopy with KV resulted in significantly less C0–C1 and C3–C4 segments motion with reduced cumulative upper cervical spine motion from C0 to C4. Prior studies done by Ali et al.[1] and Bharti et al.,[3] respectively, have shown that KV and TV significantly improve laryngoscopic view as compared to

| Table 3: Neurological status of patients in (TV: TruView and KV: King Vision group). |
|---------------------|---|---|
| Neurology status   | TV | KV |
| ASIA A             | 2  | 1  |
| ASIA B             | 7  | 6  |
| ASIA C             | 11 | 12 |
| ASIA D             | 7  | 8  |
| ASIA E             | 3  | 3  |

| Table 4: Demographic and ASA distribution among groups. |
|---------------------|------------------|---|
| Variable            | Group KV         | Group TV |
| Age (years) (mean±SD)| 44.07±17.60      | 48.27±15.89 | 0.336 |
| Weight (kg) (mean±SD)| 60.10±9.38       | 64.27±8.23  | 0.073 |
| Gender              | Male             | Female |
|                     | 24 (80%)         | 26 (86.7%) | 0.488 |
|                     | 6 (20%)          | 4 (13.3%)  |
| ASA classification   | ASA I            | ASA II |
|                     | 8 (26.7%)        | 10 (33.3%) |
|                     | 5 (16.7%)        | 16 (53.3%) |
|                     | 0.286            | 0.136    |
| Mallampati class    | MPC I            | MPC II |
|                     | 9 (30%)          | 10 (33.3%) |
|                     | 6 (20%)          | 15 (50%)  |
|                     | 0.063            | 0.097    |
| Upper lip bite test (ULBT) score | ULBT I | ULBT II | ULBT III |
|                     | 28 (93.3%)       | 1 (3.3%)  |
|                     | 26 (86.7%)       | 3 (10%)   |
|                     | 1 (3.3%)         | 1 (3.3%)  |
|                     | 0.584            | 0.026    |

TV: TruView, KV: King Vision

| Table 5: Comparison of different measures of ease of intubation among groups. |
|---------------------|------------------|---|
| Variable            | Group KV         | Group TV |
| IDS (Mean±SD)       | 0.70±1.02        | 1.67±1.27 |
|                     | 0.001            | 0.007    |
| Easy (IDS=0)        | 17 (56.7%)       | 6 (20%)  |
|                     | 0.002            | 0.026    |
| Time of intubation  | 25.98±14.93      | 39.74±19.07 |
|                     | 0.002            | 0.097    |
| Subjective lifting force: normal | 29 (96.66%) | 22 (73.33%) | 0.026 |
| Subjective lifting force: elevated | 1 (3.33%) | 8 (26.66%) |

TV: TruView, KV: King Vision

| Table 6: Comparison of heart rate among groups KV and TV. |
|---------------------|------------------|---|
| Variable            | Group            | Mean±SD |
| Heart rate (baseline) | KV              | 83.53±15.68 |
|                     | TV               | 79.03±13.80 |
| HR1                 | KV              | 94.33±16.00 |
|                     | TV               | 90.50±17.35 |
| HR2                 | KV              | 90.70±15.11 |
|                     | TV               | 89.03±16.40 |
| HR3                 | KV              | 87.40±13.36 |
|                     | TV               | 82.56±16.31 |
| HR4                 | KV              | 86.10±12.74 |
|                     | TV               | 82.23±16.31 |
| HR5                 | KV              | 84.07±11.58 |
|                     | TV               | 77.20±19.71 |

TV: TruView, KV: King Vision

| Table 7: Comparison of MAP among groups KV and TV. |
|---------------------|------------------|---|
| Variable            | Group            | Mean±SD |
| Mean arterial pressure (MAP) (baseline) | KV | 89.87±14.06 |
|                     | TV               | 90.13±16.79 |
| MAP1                | KV              | 95.17±14.24 |
|                     | TV               | 96.33±17.74 |
| MAP2                | KV              | 93.67±12.53 |
|                     | TV               | 97.90±17.78 |
| MAP3                | KV              | 89.43±12.71 |
|                     | TV               | 92.17±13.66 |
| MAP4                | KV              | 85.37±11.59 |
|                     | TV               | 84.83±14.70 |
| MAP5                | KV              | 84.20±10.06 |
|                     | TV               | 84.70±15.33 |

TV: TruView, KV: King Vision, MAP: Mean arterial pressure
Macintosh and McCoy in cervical spine immobilization. We additionally found that KV gives better IDS versus TV EVO2 (P = 0.0001). We found that the average intubation time was significantly less with the KV versus TV. The blade of the KV is designed in such a way that it coincides with the anatomical curvature of the oropharynx making it easier to insert with MILS. However, Priyanka et al. had contrary findings; the KV took significantly more time than the TV for intubation.

The more anatomically fitting design of the KV laryngoscope allowed lesser vertical force to achieve glottic alignment as compared to the TV, which resulted in lesser dental and soft-tissue injury versus TV. Further, the differences of rise in heart rate as well as MAP between the two groups were not statistically significant.

Although both the laryngoscopes provided good glottic view, the KV was slightly better (e.g., ease of insertion with MILS, shorter intubation time, less soft-tissue injury, and reduced hemodynamic changes). The KV further has a provision of disposable blade which removes the concerns of contagious infections. Finally, there were no significant changes in neurological status between the two groups utilizing KV versus TV, thus highlighting the safety of the procedure.

**CONCLUSION**

King Vision has several advantages over TruView for intubating patients who have sustained cervical spine trauma. Nevertheless, both laryngoscopes afford comparable glottic views and safety profiles with similar alterations in hemodynamics.

**Declaration of patient consent**

Institutional Review Board (IRB) permission obtained for the study.

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**Conflicts of interest**

There are no conflicts of interest.

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