ORIGINAL ARTICLE

A single-centre case series assessing the Ambu® aScope™ 2 for percutaneous tracheostomies: A viable alternative to fiberoptic bronchoscopes

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BACKGROUND: Bronchoscope-assisted bedside percutaneous tracheostomy is increasingly common in the intensive care unit (ICU). Fiberoptic bronchoscopes (FOBs) are expensive, fragile and may be damaged in the busy ICU environment. The Ambu® aScope™ 2 is a disposable video bronchoscope with no suction port that may be an alternative.

METHODS: The present analysis was a single-centre investigation of quality improvement series substitution of Ambu® aScope™ 2 for FOB during percutaneous bedside tracheostomy with a FOB readily available. Physicians could elect not to use the Ambu® aScope™ 2.

RESULTS: The Ambu® aScope™ 2 was used in 22 of 30 percutaneous bedside tracheostomies between September 9, 2012 and January 3, 2013. One conversion to an FOB occurred during the 22 procedures due to bleeding, resulting in a conversion rate of approximately 5%. The rate of completion of the postprocedure questionnaire was 73% (16 of 22), with a mean ‘ease of use’ score of 8.19/10 (range 6/10 to 10/10) and a mean ‘visualization’ score of 6.1/10 (range 2/10 to 10/10).

DISCUSSION/CONCLUSIONS: Ambu® aScope™ 2 was a reasonable alternative to FOB in a selected group of patients for bedside ICU PDT. Use of this new disposable scope will depend on local factors, processing delays and cost.

Key Words: Bronchoscope; Cost effective; Percutaneous tracheostomy

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The use of bronchoscopy (fiberoptic or camera based) has increased the safety of the original procedure by facilitating landmarking of the insertion site and confirming placement of the tracheostomy (7). This benefit, however, comes at a cost. Several authors have reported fiberoptic bronchoscope (FOB) damage during the procedure (9,10). This is usually due to penetrating needle puncture or blunt crush forces. In an attempt to mitigate costs associated with bronchoscope repairs while still providing safe, timely PDT to our patients, our institution trialed a single-use flexible intubation scope (Ambu® aScope™ 2, Ambu A/S, Denmark).

METHODS

As part of a quality improvement initiative, a single-centre substitution of the Ambu® aScope™ 2, in the place of the usual FOB, during PDT was performed. The patients selected were medically stable, with minimal to moderate secretions. A standard FOB, prepared at the bedside, was available should substitution be required. The physicians performing the procedure evaluated the adequacy of the Ambu® aScope™ 2 for this procedure using a series of subjective questions about visualization and ease of use. All physicians performing PDT were experienced operators.

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TABLE 1
Test results

| Conversion to regular fibreoptic bronchoscopy | 1/22 (4.5) |
| Adequate for procedure | 20/22 (91) |
| Ease of use (1–10) | 16/22 (73) |
| Rate of response | 8.19±1.51 |
| Mean ± SD | 15/22 (68) |
| Visualization (1–10) | 6.1±2.53 |

Data presented as n/n (%) unless otherwise indicated. ‘Ease of use’ and ‘visualization’ were assessed on a 10-point Likert scale, with 10 being perfect and 1 being inadequate for the procedure.

TABLE 2
Comments from low visualization scores

| Visualization score | Comments |
|---------------------|----------|
| 3                   | Light source not sufficient for transillumination to place tracheostomy. Visualization would be improved with a brighter light source and addition of suction capability. |
| 3                   | Needed to convert to regular bronchoscopy due to bleeding and lack of suctioning |
| 2                   | I’m very concerned re: visualization + safety… Ok generally as procedure can be done without scope and most always no complication. However, if there was a complication having to change scopes would be hard to defend as delay would be significant. |

DISCUSSION
Our series demonstrated that, in a general ICU population, the Ambu® aScope™ 2 performed adequately for PDT in a population selected for ease of use. Our recommendation would be that PDT procedures using the Ambu® aScope™ 2 should have an FOB readily available should visualization issues or the need for suction be encountered. Furthermore, successful use of the Ambu aScope™ 2 will depend on an easily accessible suctioning apparatus with the ability to provide suction before and during the procedure necessary. It is likely that next-generation disposable bronchoscopes will integrate a suction port.

There were no negative sequelae in our series using the Ambu® aScope™ 2. However, the present study involved a small nonsequential series of patients. Concerns were raised by a minority of operators regarding the potential need for suctioning rapidly and the light intensity of the Ambu® aScope™ 2, particularly if there is a need for bright transtracheal illumination during the procedure. It should be noted that patients were preselected for the present series because clinicians could ‘opt out’ based on patient and clinical characteristics, although this occurred in only eight cases. These findings may not apply to patients with more difficult anatomy or those who require ongoing suctioning throughout PDT.

ICUs can be ‘hostile environments’ for FOBs due to the acuity of patients, the multiplicity of care providers, and the decreased amount of control over the environment compared with the operating theatre or bronchoscopy suite. A recent cost analysis of fibreoptic bronchoscopy in the anesthetic suite yielded a cost of $94.95 per procedure inclusive of repair, capital, cart and processing costs over the anticipated five years of use (12). This likely underestimates the costs in an ICU, where environments may not be as controlled as in the anesthetic suite, and the damage requiring repair is likely higher than the 1.2% of procedures found in the study conducted in the anesthetic suite. Furthermore, our institution has significantly higher costs in an ICU, where environments may not be as controlled as in the anesthetic suite, and the damage requiring repair is likely higher than the 1.2% of procedures found in the study conducted in the anesthetic suite. Approximately 5% conversion rate (Table 1). The rate of completion of the postprocedure questionnaire was 73% (16 of 22). The mean score for the ‘ease of use’ category was 8.19 (range 6 to 10). The mean score for ‘visualization’ was 6.1 (range 2 to 10). Visualization with Likert scores ≤3 (19% [three of 16]) had associated comments included in Table 2.

RESULTS
They were 30 tracheostomies in total performed in the ICU over this time period.

One conversion to a FOB occurred during the 22 procedures due to bleeding and the need for ongoing suction, resulting in an approximate 5% conversion rate (Table 1). The rate of completion of the postprocedure questionnaire was 73% (16 of 22). The mean score for the ‘ease of use’ category was 8.19 (range 6 to 10). The mean score for ‘visualization’ was 6.1 (range 2 to 10). Table 2 shows that visualization with Likert scores ≤3 (19% [three of 16]) had associated comments included in Table 2.
Ambu® aScope™ 2 for PDT

Furthermore, the disposable bronchoscopes do not require sterile processing, thereby avoiding potential infection control issues and the inconvenience of processing downtime. As a result of the present trial, our ICU has elected to use this device for most of our uncomplicated PDT procedures.

DISCLOSURES: The authors have no financial disclosures or conflicts of interest to declare.

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disposable bronchoscope is approximately CAD$200. Not accounted for elsewhere and warranting consideration is the environmental impact of such a one-time use product.

Our institution found that these disposable bronchoscopes are a reasonable alternative to FOBs but need to be used with suitable safety precautions in place and in an appropriate patient population. There may be a role for an inexpensive bronchoscope that provides adequate visualization and does not require the gentle care needed for glass-fibre (ie, fibreoptic)-based bronchoscopes in a busy ICU environment.

Furthermore, the disposable bronchoscopes do not require sterile processing, thereby avoiding potential infection control issues and the inconvenience of processing downtime. As a result of the present trial, our ICU has elected to use this device for most of our uncomplicated PDT procedures.

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