AN IMPROVED METHOD FOR ENDOTRACHEAL INTUBATION DURING ANESTHESIA

CARL E. WASMUTH, M.D., and MARIETTA PORTZER, B.S.
Department of Anesthesiology

THE increasing use of endotracheal intubation during general anesthesia has
made deficiencies apparent in the usual pattern of endotracheal catheters.
For example, each of the numerous endotracheal tubes requires a correspond-
ingly sized metal adapter for connection to the gas machine, and the adapter
itself may be one of many shapes as well as types of slip-joint connectors. When-
ever the adapter is placed within the endotracheal catheter, it reduces the size
of the lumen of the catheter, causes turbulence in the gas flow and thereby in-
creases resistance of the flow within the system. Currently used endotracheal
catheters are made of rubber or heavy plastic. They are rather stiff and tend to
kink when they are bent (Fig. 1a, a'). These nonpliable tubes predispose to sore
throat and coughing and, also, through constant pressure cause ulceration and
edema of the patient's anterior tracheal wall\(^1\) and ulceration of the posterior
laryngeal commissure. Furthermore, the continual rubbing of the rough
catheter surfaces against these structures during respiratory movements, causes
aggravation and occasionally granuloma formation.\(^2,3\)

We have overcome these disadvantages by using a nonkinking endotracheal
tube*, which at body temperature becomes pliable and adapts itself easily to
the anatomic configuration of the upper respiratory tract (Fig. 1b, b'), yet
which possesses the necessary rigidity for intubation. The tube is made of clear
vinyl plastic of a high molecular weight. The method of construction is similar
to that of a latex catheter. Each tube is individually molded on a form that is
dipped into the coagulated vinyl plastic material. The tube is then heat-cured
in much the same way as is latex rubber. This process gives the tube many of the
characteristics of latex rubber, such as resistance to heat, pliability, and smooth-
ness. However, it has an advantage over rubber: there is more body to it and,
as a result, in relation to its wall thickness it can form a larger lumen. It can be
autoclaved satisfactorily at 15-pound pressure for 15 minutes, but does not
tolerate so much heat as does rubber. By the end of the 15-minute sterilizing
period some of the plasticizer has evaporated and the tube may become too stiff.

This endotracheal tube will not easily kink; therefore, when the tube emerges
from the mouth or the nose it may be bent to conform to the contour of the face
without compromising the airway (Fig. 2). The length is appropriate for connec-
tion to the gas machine at a point distant from the mouth or nose and yet the
dead space is not increased over that of the usual connections. The flare end of
the tube permits adaptation directly to the Y Adapter or to the Adams Adapter,
and eliminates need for any slip-joint adapters.


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We have used this vinyl plastic type of tube for the past year in more than 3000 cases. Originally it was designed to satisfy requirements in surgery of the head and the neck, but its numerous advantages became so apparent that now it is used generally in all types of surgery requiring endotracheal intubation (Fig. 3). The advantages of the tube are apparent: 1. Decreased bulk upon the face of the intubated patient; this is ideal for surgery about the head and the face. 2. Smooth surface and pliability of the tube. At body temperature the endotracheal tube becomes readily pliable and will adapt itself to the anatomic conformity of the upper respiratory tract. This helps to eliminate pressure points and decreases the irritation to the larynx and tracheal mucous membrane. 3. The lumen of the endotracheal tube is not reduced by the insertion of slip-joint connectors. The flare end adapts directly to the Y and the Adams Adapter of the circle-system. In most cases the lumen of this connection is much greater than the lumen of the endotracheal tube.
Fig. 2. The vinyl plastic tube introduced into the trachea via the nasal route and adapted directly to the Adams Adapter.

Fig. 3. Possible adaptations of the vinyl plastic tube for endotracheal intubation.
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Summary

An improved, nonkinkable, vinyl plastic endotracheal tube is described which has the advantages of uniform pliability and rigidity, and direct adaptation to the gas machine, eliminating use of connectors.

References