



Laryngology Seminar - Percutaneous Tracheostomy

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Introduction

- Shelton in 1955: A new method of tracheostomy
- Toye and Weinstein in 1969: A percutaneous tracheostomy device: 6% tube displacement
- The Ciaglia method, developed in 1985, uses graded dilators and is currently the most popular method.
- The Griggs technique, described in 1990, is a one-stage dilation technique using a modified Howard-Kelly forceps as tracheal dilator

Percutaneous tracheostomy



Figura 1

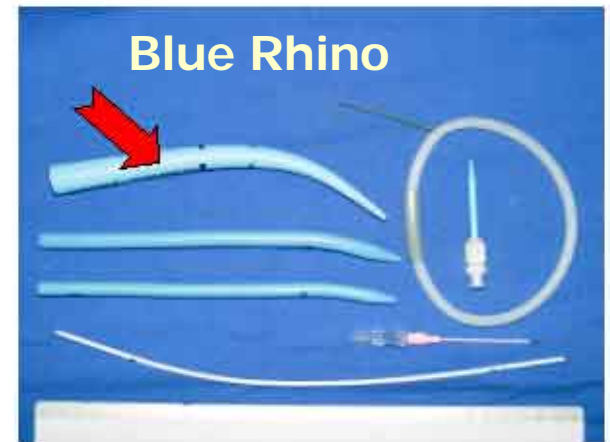


Figura 2



Figura 3

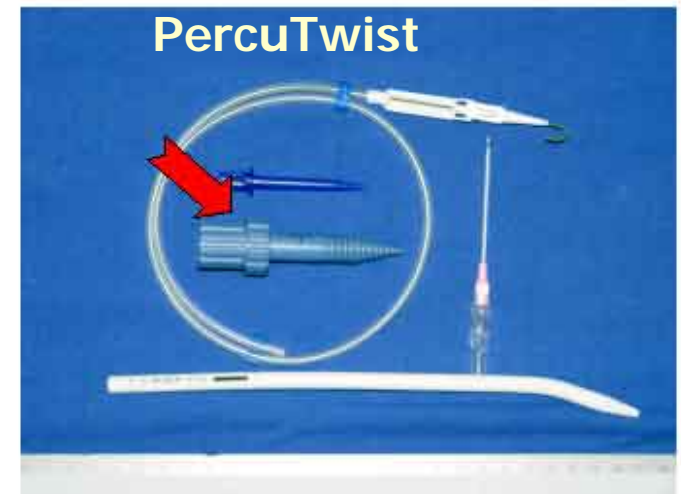
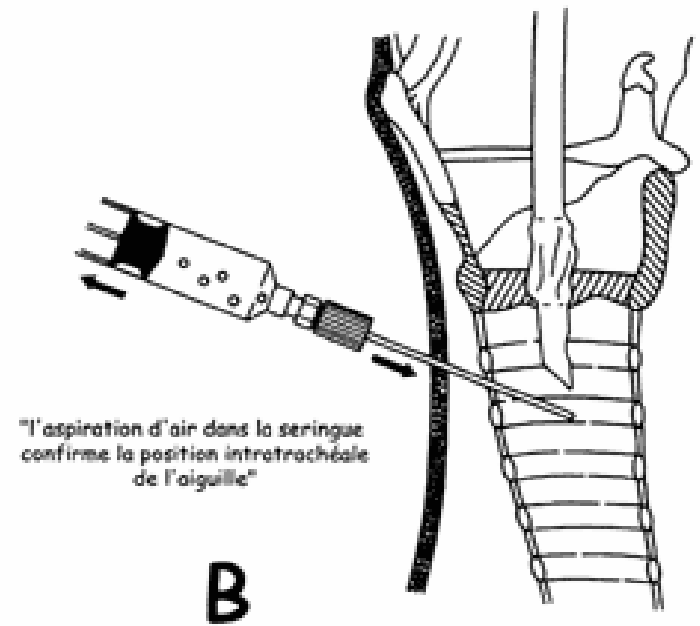
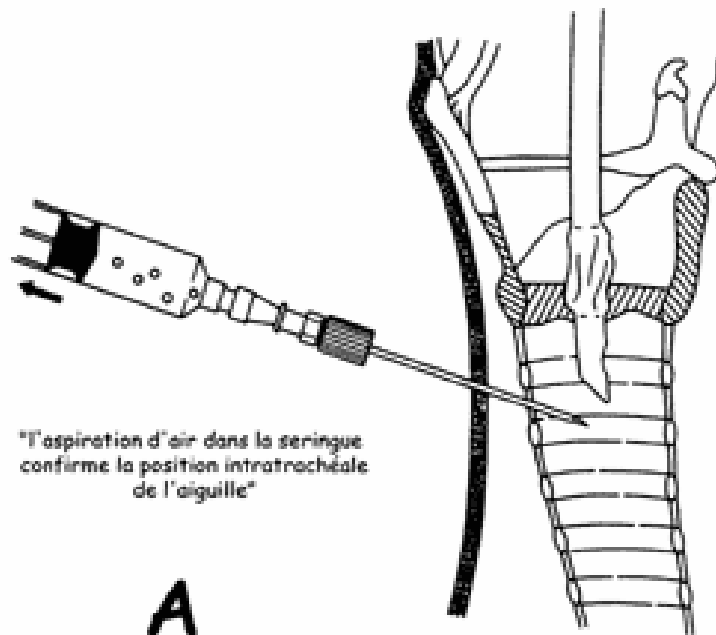
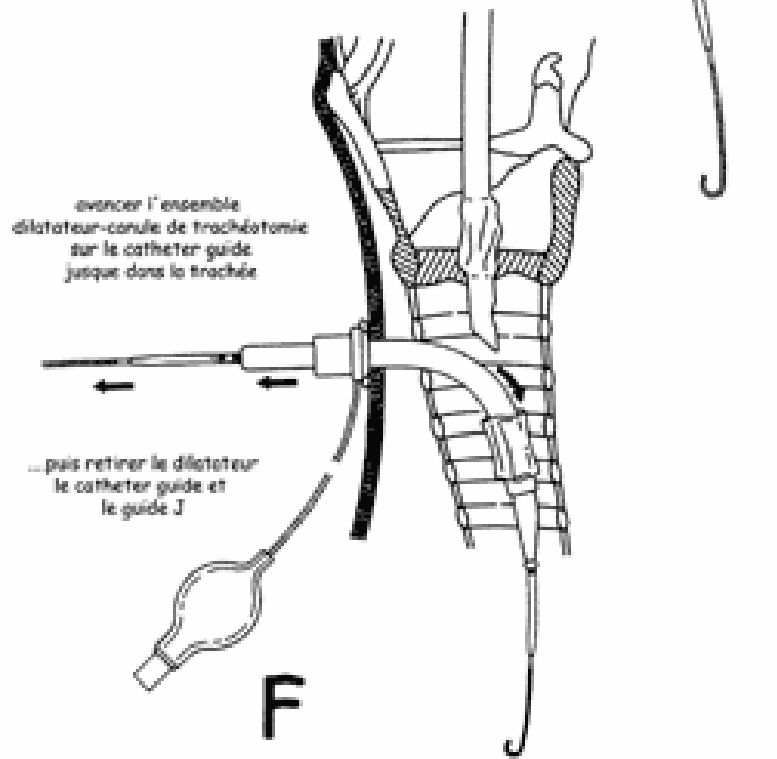
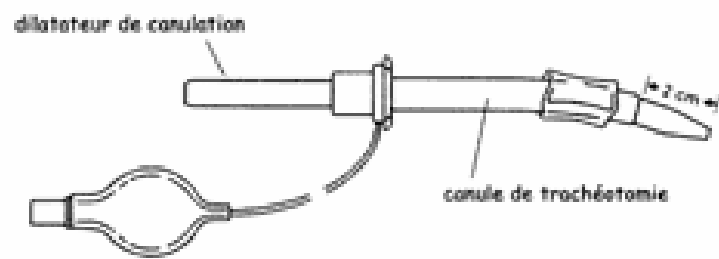
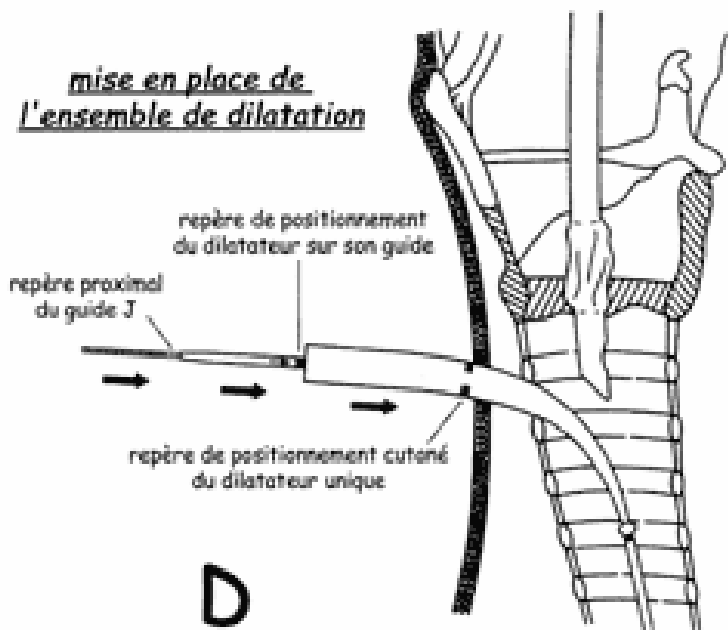
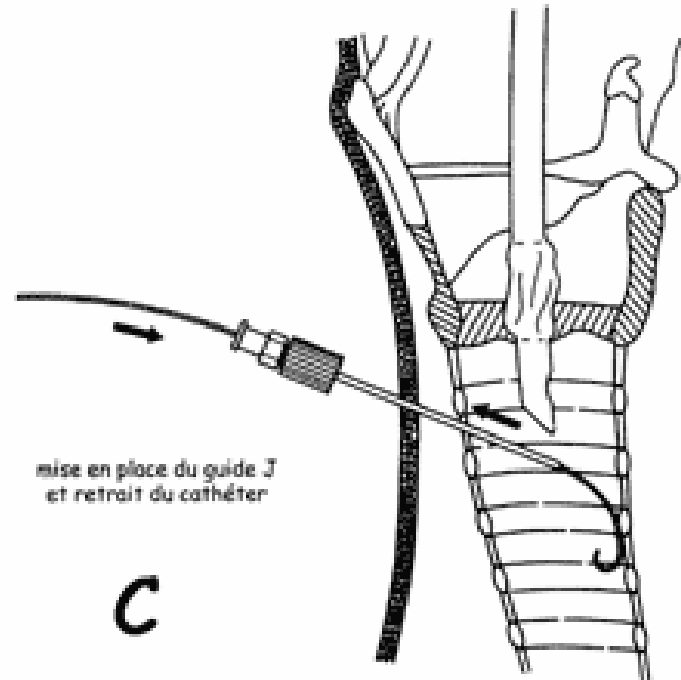
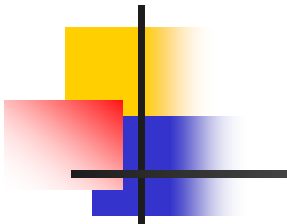


Figura 4

Ciaglia's Blue Rhino Method





PercuTwist Method

Méthode de FROVA - PercuTwist™

DIFFÉRENTES FORCES DE ROTATION

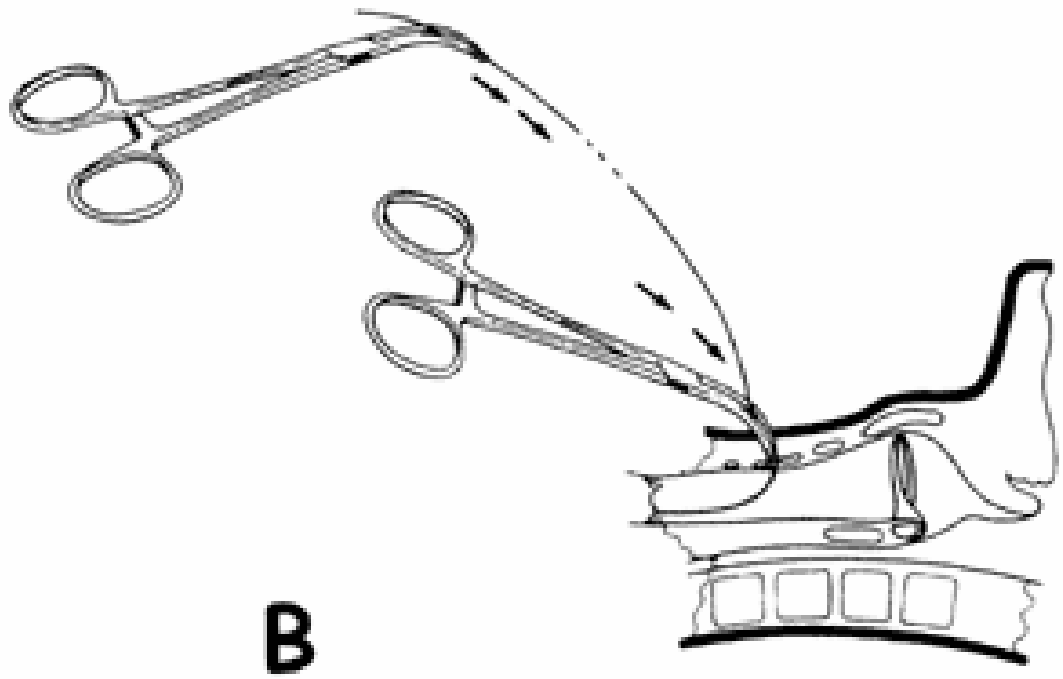
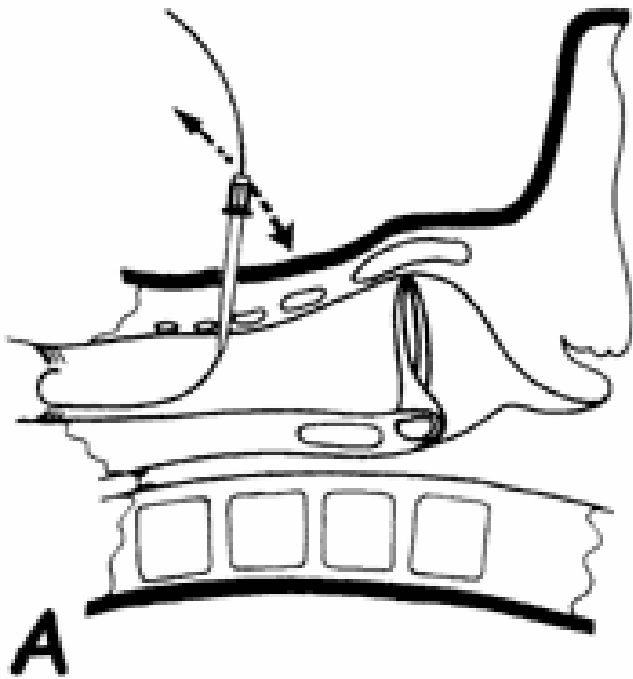
Les différents diamètres au niveau de la poignée permettent d'exercer différentes forces de rotation lors de la pénétration dans le tissu, suivant le besoin de chacun. La force exercée est moins importante en haut de la poignée tandis que la rotation du bas de la poignée augmente la force exercée.

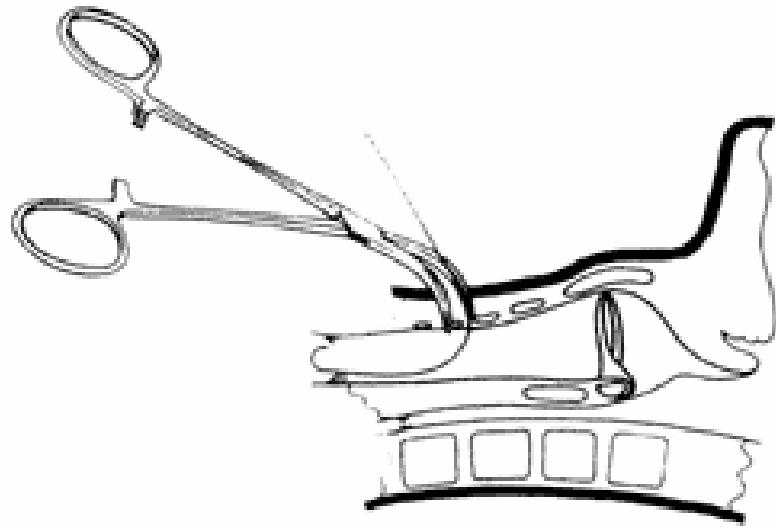
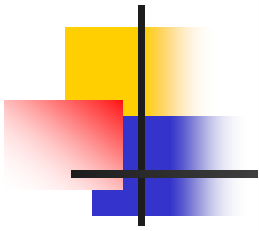


SÉCURITÉ OPTIMALE

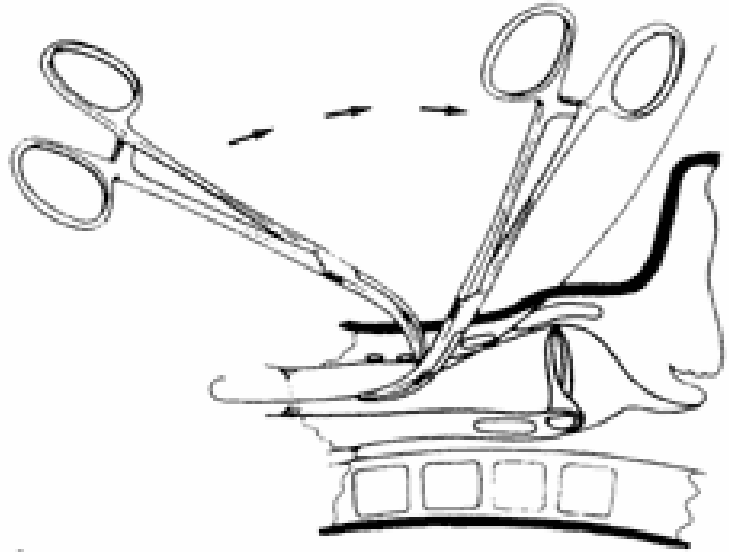
Le nouveau revêtement hydrophile du pas de vis tranchant facilite l'introduction dans les tissus et réduit ainsi la force requise. Les forces nécessaires à la pénétration peuvent être contrôlées à chaque tour.

Grigg's Method

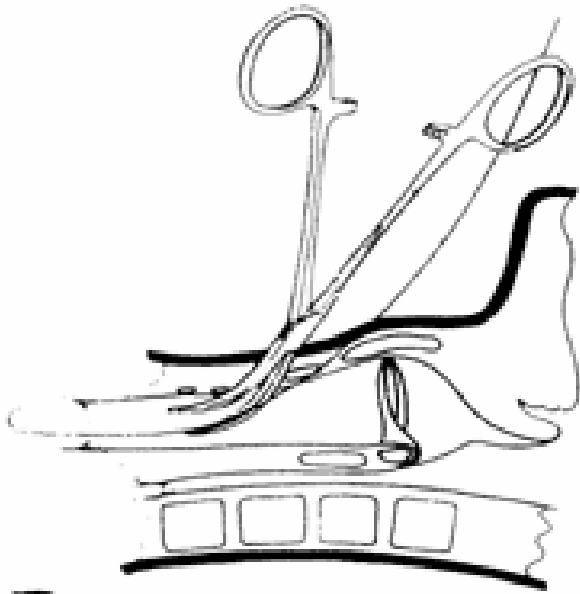




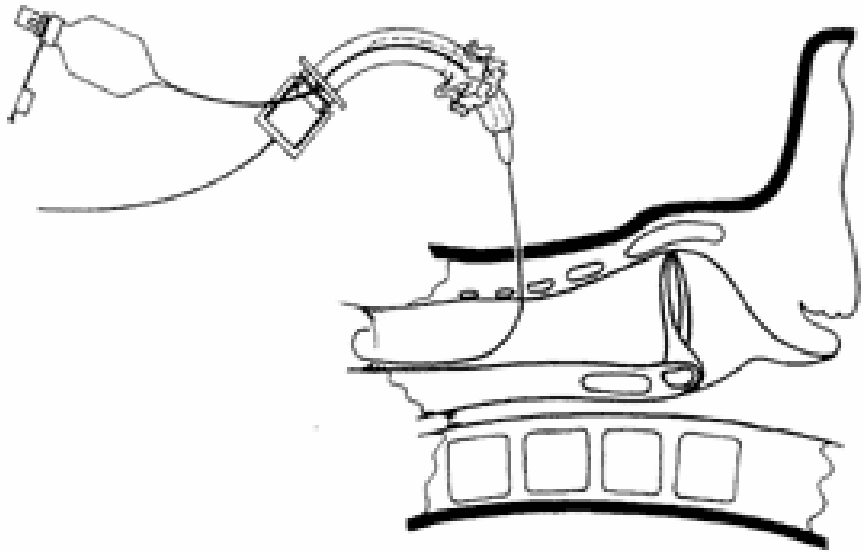
C



D



E



F

Fantoni's Method

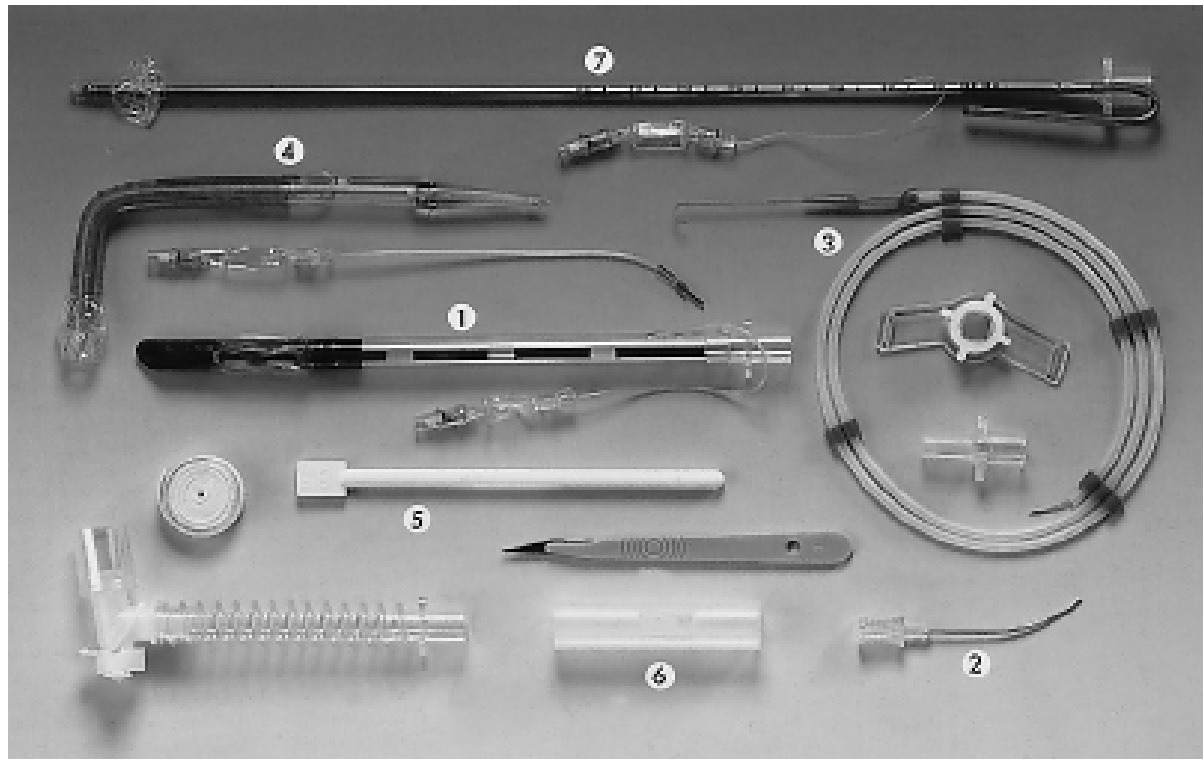
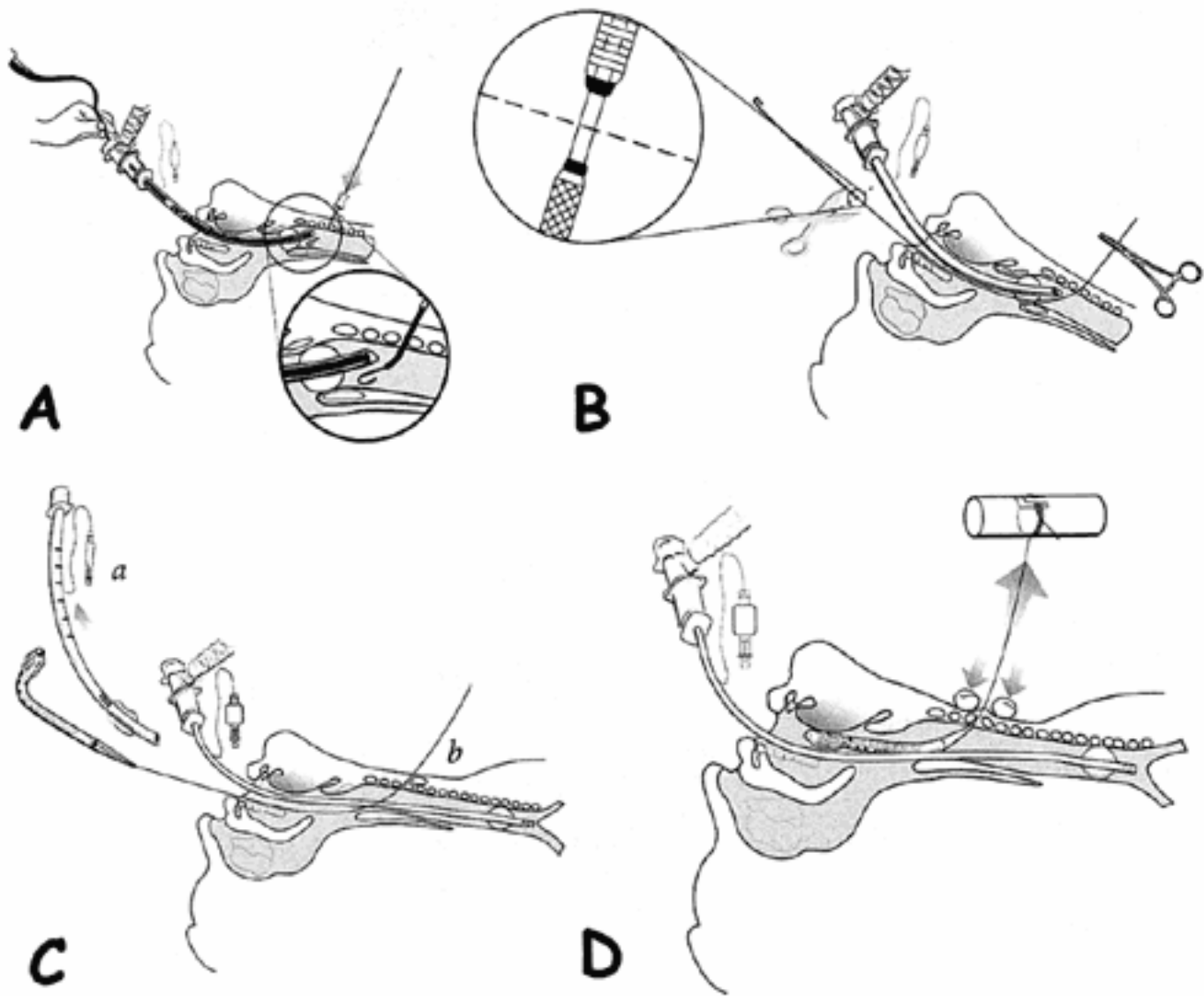
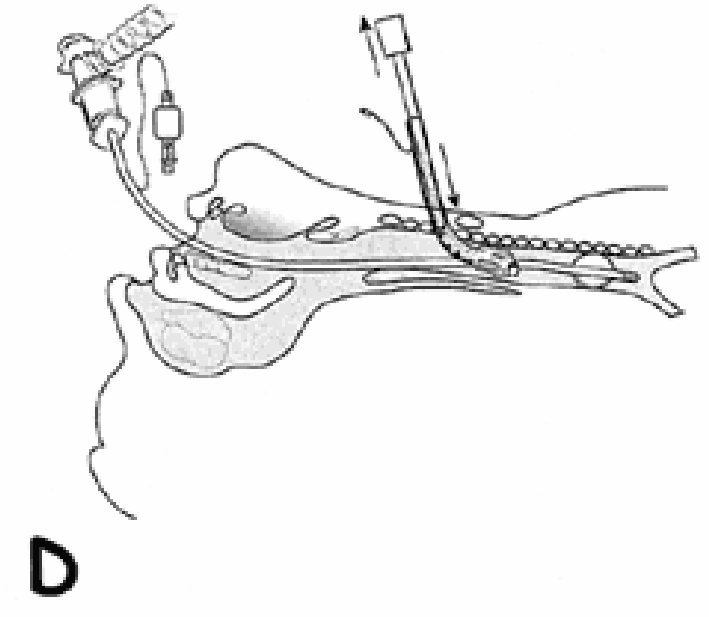
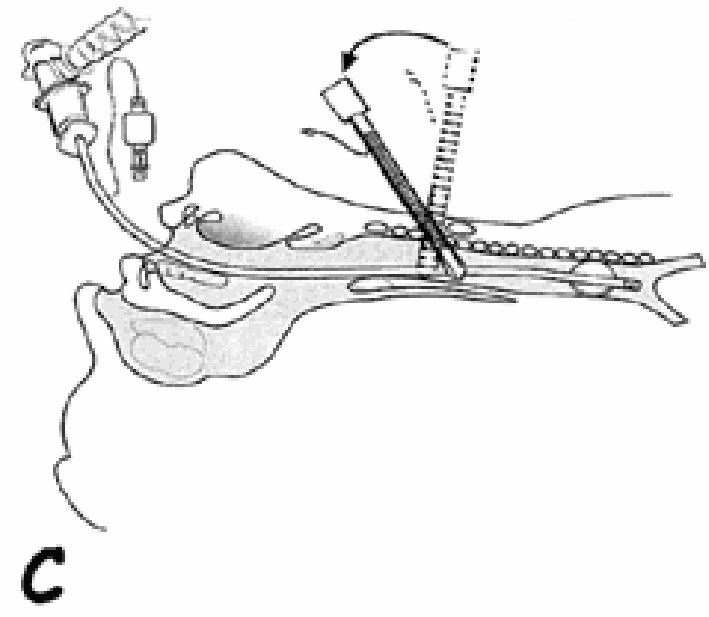
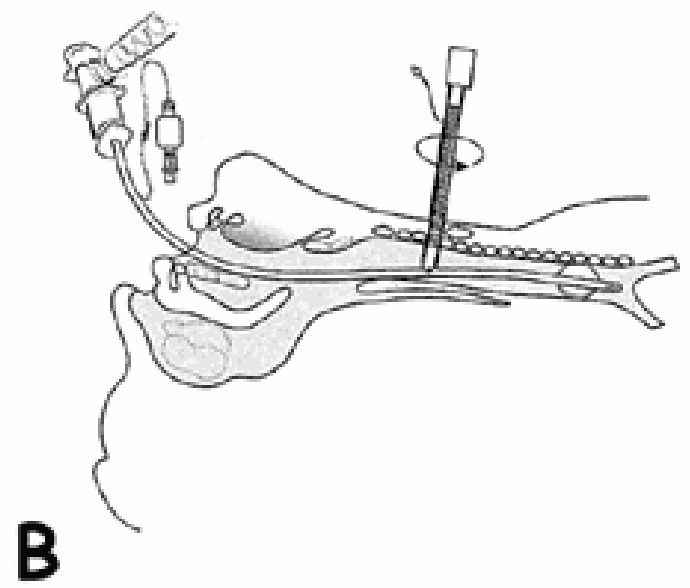
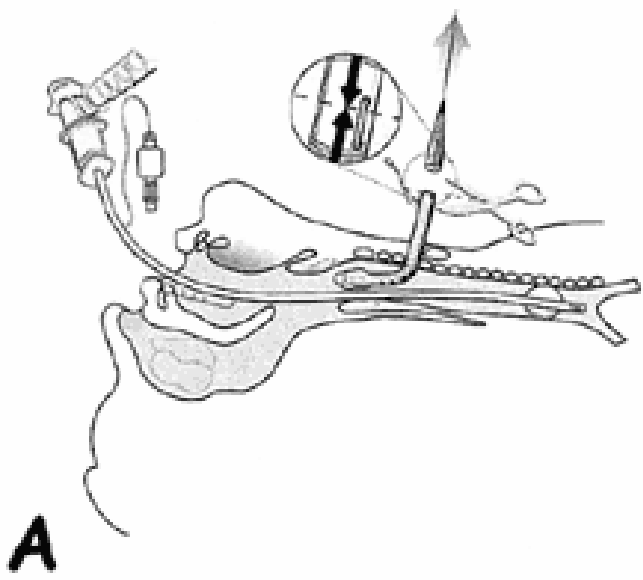
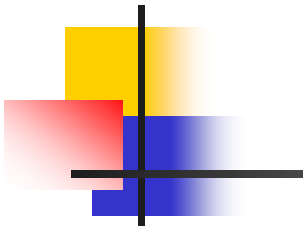


Fig.1 Kit for TLT with essential components enumerated *1* rigid cuffed tracheoscope; *2* curved needle; *3* wire; *4* cone-cannula device and cuff balloon and attachable inflating tube with pilot bag; *5* plastic obturator for rotating the cannula; *6* pull handle; *7* cuffed catheter

Fantoni's Method







Single V.S Multiple dilator

- Prospective randomize trial, 50 patients
- Single-dilator: 6.01+3.03 mins
Multiple-dilator: 10.01+4.26 mins (P<.0006)
- No significant difference in complication between 2 technique(12:14)
- Single: minimize risk of injury to the posterior tracheal wall
- Routine bronchoscopy is unnecessary if surgeon is directly palpating the trachea

Percutaneous dilational tracheostomy: A comparison of single versus multiple dilator techniques. *Critical Care Medicine* 2001; 29:1251



PercuTwist V.S Blue Rhino

- Prospective randomized trial, 70 patients
- PercuTwist:
 - lift anterior tracheal wall during dilation
 - keep tracheal lumen opening
 - unrestricted bronchoscopic view at any time
- PercuTwist:
 - the stoma remains opening even after removal the dilator



PercuTwist V.S Blue Rhino

Table 1 Subjective assessment of the procedure (*PT* PercuTwist; *CBR* Ciaglia Blue Rhino)

	I		II		III		IV	
	PT	CBR	PT	CBR	PT	CBR	PT	CBR
Stoma dilation (n)	30	33	5	2	0	0	–	–
Tracheostomy cannula insertion (n)	21*	33	6	1	2	1	6*	0

* $p < 0.05$ vs. Ciaglia Blue Rhino

Stoma dilation

- I – no difficult
- II - some difficult, but possible
- III- impossible, switch another method

Tracheostomy cannula insertion

- I – no difficult
- II - minor difficult
- III- Very difficult, but possible
- IV- insertion impossible, switch another method



PercuTwist V.S Blue Rhino

Table 2 Complications during PercuTwist (PT) and Ciaglia Blue Rhino (CBR) tracheostomy

Complications	Intervention	PT	CBR
<u>Serious complications</u>			
Cardiopulmonary arrest	Conversion to CBR after reintubation	1	0
Tracheoesophageal fistula	Surgical repair required	1	0
Intermediate complications			
Posterior tracheal wall perforation	None	1	0
<u>Minor complications</u>			
Cannula false passage	Conversion to CBR	1	0
Cannula insertion impossible	Conversion to CBR	4	0
Tracheal cartilage fracture	None	1	1
Short oxygen desaturation (SpO ₂ <90%)	None	1	1
Cuff lesion during cannula insertion	Cannula exchange	0	1
Subcutaneous emphysema	None	0	1
Bleeding	None	2	3
Overall complications		12	7

Single dilator percutaneous tracheostomy: A comparison of Percutwist versus Ciaglia blue rhino techniques. *Intensive Care Medicine* 2002; 28:1262-1266



Various method comparison

- Nates NL et al., Percutaneous tracheostomy in critically ill patient: a prospective, randomized comparison of two techniques. *Crit Care Med* 2000,28:3734~3739
- Ambesh SP et al., Percutaneous tracheostomy with single dilation technique: a prospective, randomized comparison of Ciaglia blue rhino versus Grigg's guild wire dilating forceps. *Anesth Analg* 200295:1739-1745
- Byhahn C. et al., Bedside percutaneous tracheostomy: clinical comparison of Griggs and Fantoni technique. *World J Surg* 2001,25: 296~301
- Westphal K. et al, Percutaneous tracheostomy: a clinical comparison of Ciaglia and Fantoni techniques. *Anesth Analg* 1999, 89:938~943



Important details

- Use a deflated ET cuff and increased tidal volume on ventilator → maintain normal PaCO₂
- Adequate skin incision → easy palpable and identify tracheal cartilage
- Directing the cannula needle caudally to properly identify the tracheal air column
- A new ridge on the 8F Teflon guiding catheter → prevent posterior tracheal wall injury by dilators
- Single cannula flexible TT and a longer TT if indicated

Some important details in the technique of percutaneous dilational tracheostomy via the modified Seldinger technique. *Chest 1996; 110:28:1262-1266*



Important details

- A double swivel connection and flexible tubing to connect patient to ventilator → lessen trauma to stoma
- Fenestrated TT allow taking in conscious patient
- Use a disposable end-tidal CO₂ monitor and bronchoscope → confirm intra-tracheal position
- Minor complication: 6.5% (Total: 254 patient)
Major complication: 1.5%
Mortality: 0.39%

Some important details in the technique of percutaneous dilational tracheostomy via the modified Seldinger technique. *Chest 1996; 110:1262-1266*



PDT versus ST

- 17 randomized clinical trials, 1212 patients
- Wound infection → significant reduction with PDT compared to ST
- PDT was equivalent to ST for bleeding, major peri-procedural and long term complications
- When compared to ST performed in OR → PDT results in lower incidence of bleeding, death and a trend towards shorter duration of translaryngeal intubation prior to tracheostomy

Percutaneous dilational tracheostomy versus surgical tracheostomy in critically ill patients: a systemic review and meta-analysis. *Critical care* 2006; 10:R55



PDT advantages

- Relatively simple technique suitable in ICU
- No requirement of OR room and transport
- Reduce blood loss
- Lower infection rates
- Shorter duration of translaryngeal intubation
- cosmetic scar

Percutaneous dilational tracheostomy versus surgical tracheostomy in critically ill patients: a systemic review and meta-analysis. *Critical care 2006; 10:R55*



Surgical > Percutaneous

- Emergency tracheostomy tube placement
- Difficult to palpate the anatomical landmarks:
 - very obese patient
 - short or bull neck
 - enlarged thyroid
 - nonpalpable cricoid cartilage
 - gross deviation of trachea
- Infection at or near the intended site for tracheostomy



Surgical > Percutaneous

- Malignancy at the site of tracheostomy
- In pediatric group (controversial).
Children have a more compliant trachea leading to a tendency to collapse when pressure is exerted with dilators.
- Previous neck surgery may distort the anatomy.
- In unstable cervical spine fracture.
- Uncontrolled coagulopathy (relative contraindication)