Semirigid Thoracoscopy

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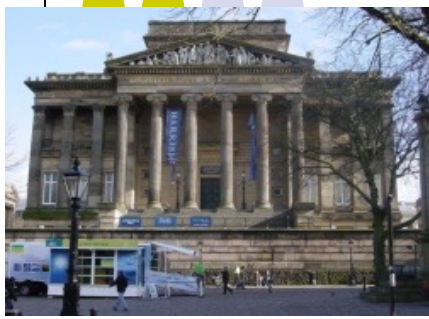
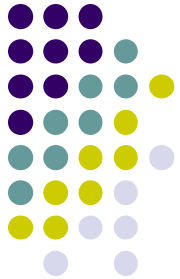


Semi-rigid Thoracoscopy

(Flexi-rigid Thoracoscopy, Pleuroscopy)

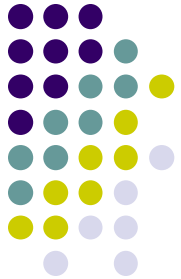


Thoracoscopy-Theoretical Aspects

Semirigid Thoracoscopy-A step by step guide

Semi-rigid Thoracoscopy

(Flexi-rigid Thoracoscopy, Pleuroscopy)



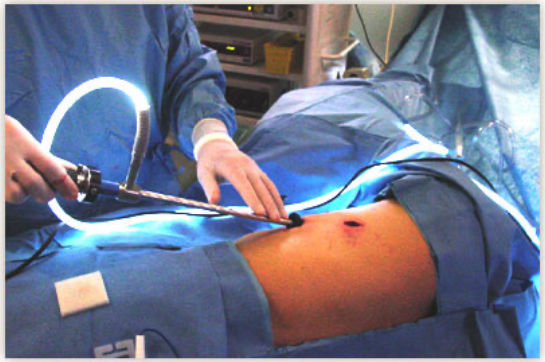
Thoracoscopy-Theoretical Aspects

Semirigid Thoracoscopy-A step by step guide

Hans-Christian Jacobaeus

- Swedish Physician/ Internist
- Inserted rigid Nitze n.14 cystoscope into pleural cavity (4.6 mm X 22 cm)
- “Thorakoscopie”
- Galvanocautery- lysis of pleural adhesions
- 1910- introduced thoracoscopy and laparoscopy
- “Jacobaeus operation”

Thoracoscopy



- Diagnostic sensitivity- 95%
- Previous neg closed pleural Bx-66%
- Management influenced by thoracoscopy in 155/ 182 (85%) patients, of whom 98(54%) had malignancy
- Complications
  - few, subcutaneous emphysema

- Harris, Mehta et al. Chest 1995;108:828-41
- Page et a. Ann Thoracic Surgery 1989;48:66-8

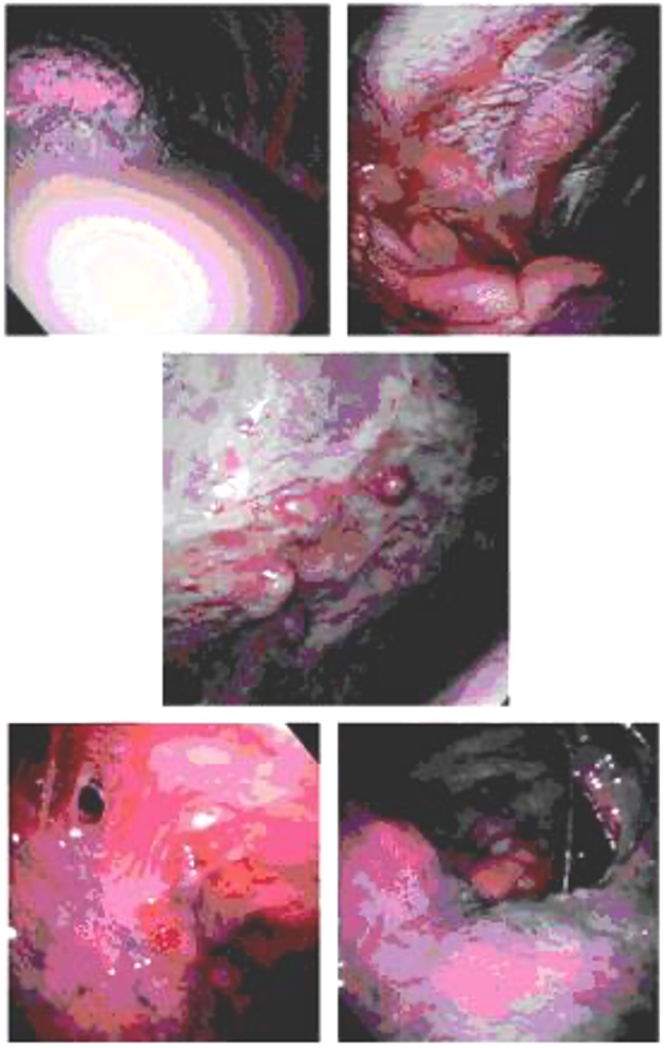
A Novel Instrument for the Evaluation of the Pleural Space*

An Experience in 34 Patients

Armin Ernst, MD, FCCP; Craig P. Hersh, MD; Felix Herth, MD, Robert Thurer, MD, FCCP; Joseph LoCicero, III, MD, FCCP, John Beamis, MD, FCCP; and Praveen Mathur, MD, FCCP

Study objectives: To test a novel semirigid pleuroscope to be used by pulmonologists for the diagnosis and treatment of pleural diseases.
Design: Prospective study.
Setting: Three tertiary referral centers for pulmonary diseases.
Patients: Thirty-four patients who were referred for medical thoracoscopy between September 2000 and April 2001.
Measurements and results: Thirty-six procedures were performed. The most common indications were for pleurodesis of a malignant pleural effusion (53%) or for evaluation of an exudative effusion of unknown etiology (44%). All operators found the instrument easy to use. In all but one case, the images were thought to be adequate, despite the presence of adhesions in 12 patients and loculations in 8 patients. Pleural biopsies were performed in 13 patients, and talc pleurodesis procedures were performed in 25 patients. Mean (± SD) duration of chest tube drainage was 2.9 ± 1.8 days postprocedure. There were no complications.
Conclusions: The prototype semirigid pleuroscope is a useful instrument in the diagnosis and management of pleural diseases. It is similar in design to a standard flexible bronchoscope, so the skills involved in operating the instrument should already be familiar to the practicing pulmonologist. It is compatible with existing video processors and light sources, so little additional equipment must be added to the endoscopy suite. The semirigid pleuroscope may allow for an increase in the performance of medical thoracoscopy by pulmonologists.

(CHEST 2002; 122:1530–1534)



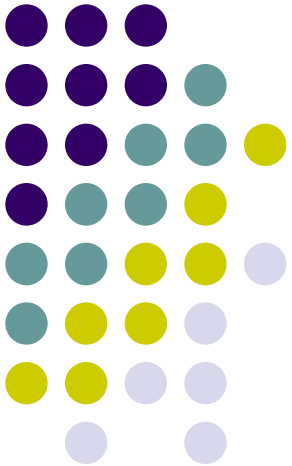
A Ernst, F Herth, P Mathur et al

CHEST 2002; 122 : 1530-1534

- XLTF-240
- 34 patients
- Pleurodesis- 53%
- Exudative, undiagnosed effusion-44%
- Images adequate in all but one cases
- Malignancy- 4/14
- “The ease of use of this new instrument and its compatibility with existing bronchoscopy equipment will open the door for pleuroscopy to become a more commonly utilised procedure in pulmonary practice”.

An innovative, autoclavable, semirigid thoracoscope-Is this the way forward?

M Munavvar, MAI Khan, Z Waqaruddin, J Edwards, J Mills
Lancashire Teaching Hospitals, Preston



BTS winter meeting- Dec 2005
ERJ 2007 Mar;29(3): 571-4

Diagnostic Accuracy and Safety of Semirigid Thoracoscopy in Exudative Effusions -A Meta-analysis

Agarwal et al CHEST 2013

17 studies- 755 patients
Sensitivity- 91%
Specificity- 100%

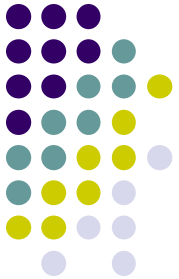
Positive likelihood ratio (PLR)-	4.92
Negative likelihood ratio (NLR)-	0.08
Pooled diagnostic odds ratio-	102.28

Heterogeneity decreased after exclusion of smaller studies <25 patients

Complications- negligible

Mortality- none

Rigid versus semi-rigid thoracoscopy for the diagnosis of pleural disease-
A randomized pilot study



- 84 patients with effusion of unknown origin and/ or pleural irregularities suspicious for malignancy randomized
- After less invasive means of diagnosis had failed
- 5 excluded –lack of pleural space
- Rigid (38) and Semi-rigid (41)
- Primary aim- Compare the size, quality and diagnostic adequacy of biopsy specimens
- Secondary- safety and tolerability of both types of procedures
- All thoracoscopies- same operator
- Histo samples reviewed and measured by a single pathologist- blinded to thoracoscopy technique/ biopsy method

Rozman A, Triller N et al Respirology 2013

Rigid versus semi-rigid thoracoscopy for the diagnosis of pleural disease- A randomized pilot study

	Rigid	Semi-rigid
Number	38	41
Average sample size	24.7 mm2 (+/- 12.9)	11.7 mm2 (+/-7.6)
Diagnostic accuracy	100%	97.6%

No differences in the quality and interpretability of the specimens- as assessed by the Pathologist

Interpretability- Easily interpretable, Interpretable with some difficulty, Interpretable with great difficulty, Non-interpretable

Quality- Without artifacts (0), small amount (1) and large amount (2)

Rozman A, Triller N et al Respirology 2013

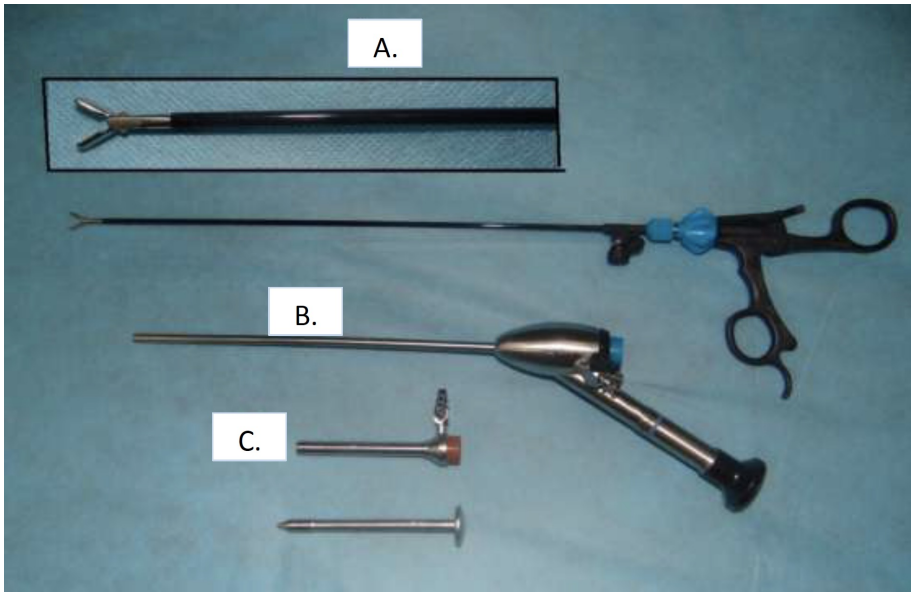
ORIGINAL INVESTIGATION

Rigid Mini-Thoracoscopy Versus Semirigid Thoracoscopy in Undiagnosed Exudative Pleural Effusion

The MINT Randomized Controlled Trial

Shweta Bansal, MD, DM, Saurabh Mittal, MD, DM,* Pavan Tiwari, MD, DM,* Deepali Jain, MD,† Sudheer Arava, MD,† Vijay Hadda, MD,* Anant Mohan, MD, PhD,* Prabhat Malik, MD, DM,‡ Ravindra Mohan Pandey, MD,§ Gopi C. Khilnani, MD,* Randeep Guleria, MD, DM,* and Karan Madan, MD, DM**

(*J Bronchol Intervent Pulmonol* 2019;00:000–000)



Primary outcome

	Mini – thoracoscopy	Semi-rigid thoracoscopy	P value
ITT Number of patients included (N) Number of diagnostic biopsies (n) **Diagnostic yield - n/ N (%)**	 36 25 **69.4 %**	 37 30 **81.1 %**	 **0.25**
As treated analysis Number of patients included (N) Number of diagnostic biopsies (n) Diagnostic yield - n/ N (%)	 33 25 75.6 %	 38 32 84.2 %	 0.30
Adequacy of biopsy	33/33 (100%)	38/38 (100%)	0.90

KEY Secondary outcomes

	Mini – thoracoscopy	Semi-rigid thoracoscopy	P value
Dose of midazolam (mg) (mean ± SD)	1.83 ± 0.78	1.77 ± 0.68	0.68
Dose of fentanyl (ug) (mean ± SD)	79.29 ± 25.35	73.11 ± 23.13	0.28
Biopsy size (mm) (mean ± SD)	**16.08 ± 4.47**	**8.31 ± 2.99**	**<0.001**
Procedure related complications (n)	3	7	0.10
Operator rated overall procedure satisfaction – (VAS)(mm) (mean ± SD)	84.47 ±13.08	84.89 ±7.43	0.87
Operator rated procedural pain (VAS)(mm) (mean ± SD)	**43.47 ±16.74**	**31.70 ±15.75**	**<0.001**

Conclusions:

- ***Diagnostic yield of rigid mini-thoracoscopy is not superior to semirigid thoracoscopy***
- ***Use of semirigid thoracoscope may provide greater patient comfort***

Respiration

Interventional Pulmonology

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Narrow Band Imaging Applied to Pleuroscopy for the Assessment of Vascular Patterns of the Pleura

Atsuko Ishida[a] Fuzuki Ishikawa[a] Miho Nakamura[a] Yuka M. Miyazu[a] Masamichi Mineshita[a]

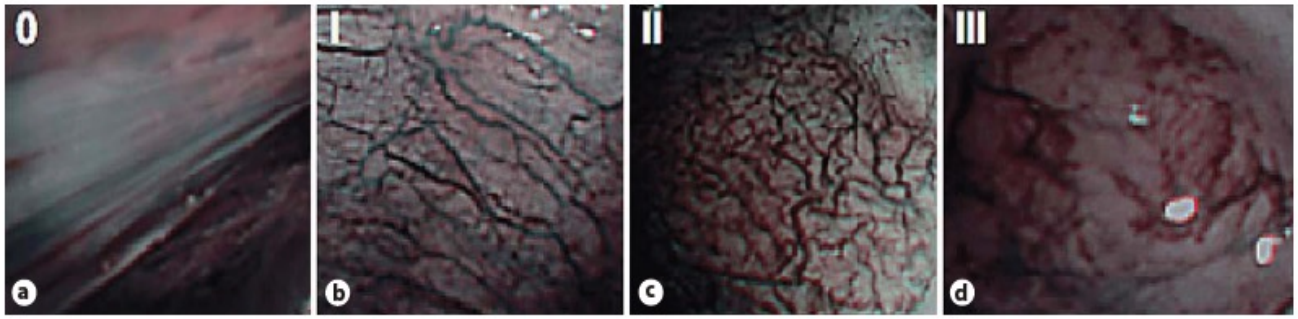


Fig. 1. Classification of the pleura regarding vascular patterns by pleura-videoscope using NBI. **a** Vascular pattern type 0: blood vessels are difficult to identify in the pleura. **b** Vascular pattern type I: pleura shows straight blood vessels without proliferation. **c** Vascular pattern type II: pleura shows proliferated blood vessels which are almost equal in caliber. **d** Vascular pattern type III: pleura shows blood vessels of irregular caliber and punctate vessels.

Table 1. Biopsy results and vascular patterns in WL and NBI by pleura-videoscope

Histological diagnosis	WL				NBI			
	0	I	II	III	0	I	II	III
Mesothelioma (n = 24)	15	0	0	9	3	0	0	21
Cancer (n = 14)	10	0	0	4	6	0	0	8
Normal pleura/inflammation (n = 35)	16	8	7	4	12	7	11	5
Total (n = 73)	41 (25)	8 (0)	7 (0)	17 (13)	21 (9)	7 (0)	11 (0)	34 (29)

Data are presented as number (malignant) of lesions. Vascular pattern: type 0 = difficult to identify blood vessels in pleura; type I = straight blood vessels without proliferation; type II = proliferated blood vessels with

Efficacy and Safety of Pleural Cryobiopsy vs. Forceps Biopsy for Evaluation of Undiagnosed Pleural Effusion: A Systematic Review and Meta-Analysis

Mohan Giri[1†], Haiyun Dai[1†], Shuliang Guo[1], Yishi Li[1], Lin He[2] and Rongjuan Zhuang[1]*

Frontiers in Medicine Apr 22

Study	Cryobiopsy Mean	Cryobiopsy SD	Cryobiopsy Total	Forceps Mean	Forceps SD	Forceps Total	Weight	Std. Mean Difference IV, Random, 95% CI
Baess et al	4.10	2.4000	24	2.70	1.0000	24	9.0%	0.75 [0.16; 1.34]
Chen et al	9.40	4.9000	92	4.20	2.3000	92	9.5%	1.35 [1.03; 1.67]
Dhooria et al	7.67	3.0600	46	4.00	1.5300	49	9.3%	1.52 [1.06; 1.98]
El Sayad et al	14.07	4.2900	26	5.04	0.5300	25	8.5%	2.88 [2.08; 3.68]
Lee et al	9.10	5.7000	28	5.30	3.8000	17	9.0%	0.74 [0.11; 1.36]
Matura et al	9.17	1.8400	6	3.75	0.9600	4	4.7%	3.12 [0.98; 5.26]
Muhhamad et al	0.34	0.2470	30	0.82	0.4040	30	9.1%	−1.42 [−1.99; −0.85]
Nakai et al	17.97	4.6300	5	6.47	0.9100	5	4.8%	3.11 [0.99; 5.23]
Pathak et al	320.00	291.2500	10	80.00	72.8100	10	8.1%	1.08 [0.13; 2.03]
Thomas et al	10.93	6.9700	22	5.00	3.9600	22	8.9%	1.03 [0.40; 1.66]
Tousheed et al	13.20	6.7000	87	6.80	3.3000	52	9.5%	1.12 [0.75; 1.49]
Wurps et al	14.40	12.8000	80	7.10	9.3000	80	9.5%	0.65 [0.33; 0.97]
Total (95% CI)			**456**			**410**	**100.0%**	**1.16 [0.51; 1.82]**

Heterogeneity: Tau^2 = 1.1278; Chi^2 = 113.90, df = 11 (P < 0.01); I^2 = 90%
Test for overall effect: Z = 3.51 (P < 0.01)

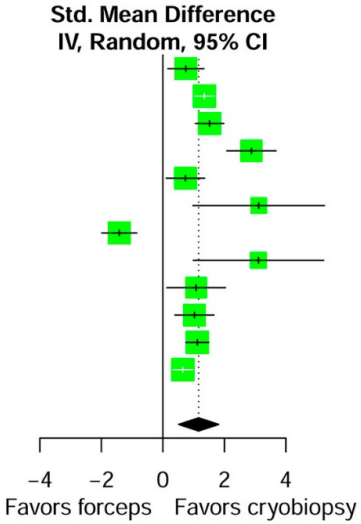
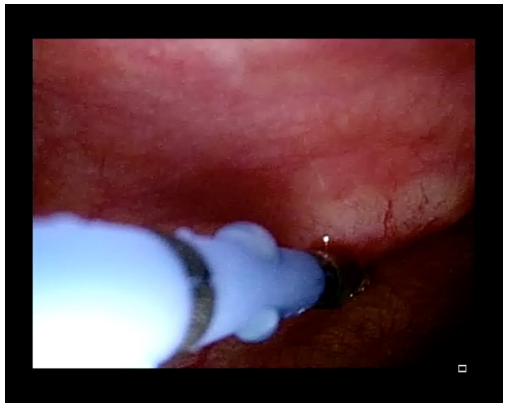


FIGURE 2 | Forest plot comparing specimen size of pleural cryobiopsy vs. forceps biopsy.



Study	Cryobiopsy Events	Cryobiopsy Total	Forceps Events	Forceps Total	Weight	Odds Ratio MH, Random, 95% CI
Ahmed et al	23	30	23	30	18.4%	1.00 [0.30; 3.31]
Baess et al	24	24	24	24	0.0%	
Chen et al	91	92	84	92	6.0%	8.67 [1.06; 70.77]
Dhooria et al	39	50	38	50	30.3%	1.12 [0.44; 2.84]
El Sayad et al	26	26	25	25	0.0%	
Ismail et al	50	50	50	50	0.0%	
Lee et al	25	28	15	17	7.3%	1.11 [0.17; 7.43]
Matura et al	6	6	3	4	2.2%	5.57 [0.18; 176.26]
Muhhamad et al	30	30	30	30	0.0%	
Nakai et al	5	5	1	5	2.2%	33.00 [1.06; 1023.56]
Pathak et al	10	10	10	10	0.0%	
Rozman et al	14	15	15	15	2.5%	0.31 [0.01; 8.28]
Thomas et al	20	22	20	22	6.2%	1.00 [0.13; 7.81]
Tousheed et al	86	87	50	52	4.5%	3.44 [0.30; 38.90]
Wurps et al	73	80	74	80	20.4%	0.85 [0.27; 2.64]
Total (95% CI)		**555**		**506**	**100.0%**	**1.32 [0.79; 2.21]**

Heterogeneity: Tau^2 < 0.0001; Chi^2 = 9.49, df = 9 (P = 0.39); I^2 = 5%
Test for overall effect: Z = 1.07 (P = 0.29)

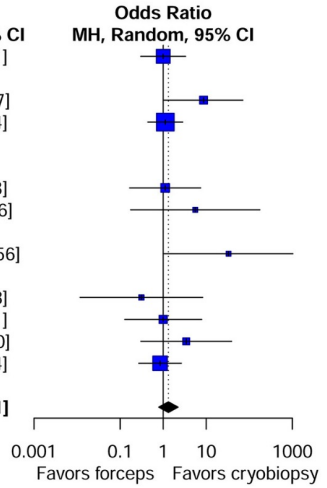
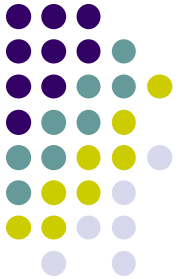


FIGURE 3 | Forest plot comparing diagnostic yield of pleural cryobiopsy vs. forceps biopsy.

Semi-rigid Thoracoscopy
(Flexi-rigid Thoracoscopy, Pleuroscopy)

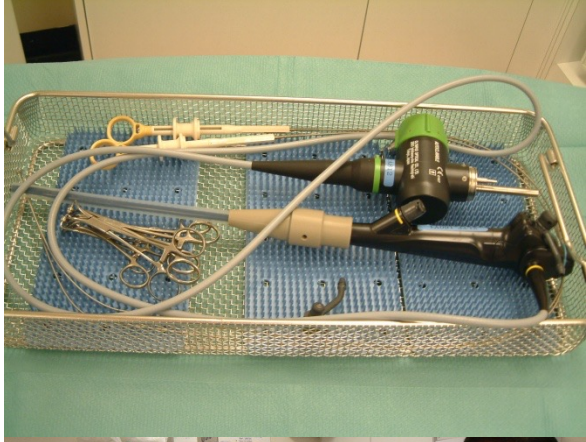


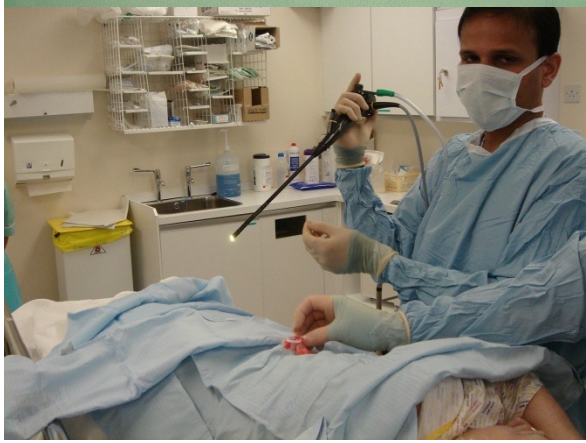
Thoracoscopy-Theoretical Aspects

Semirigid Thoracoscopy-A step by step guide

The Equipment

- LTF-260 Pleuravideoscope
- Olympus, Tokyo- Keymed
- Length- 27cm
- Distal flexible- 5cm
- Outer diameter- 7mm
- Instrument Channel- 2.8 mm
- Angulation- 160° and 130°
- Standard video processors-
- **AUTOCLAVABLE**





The Procedure

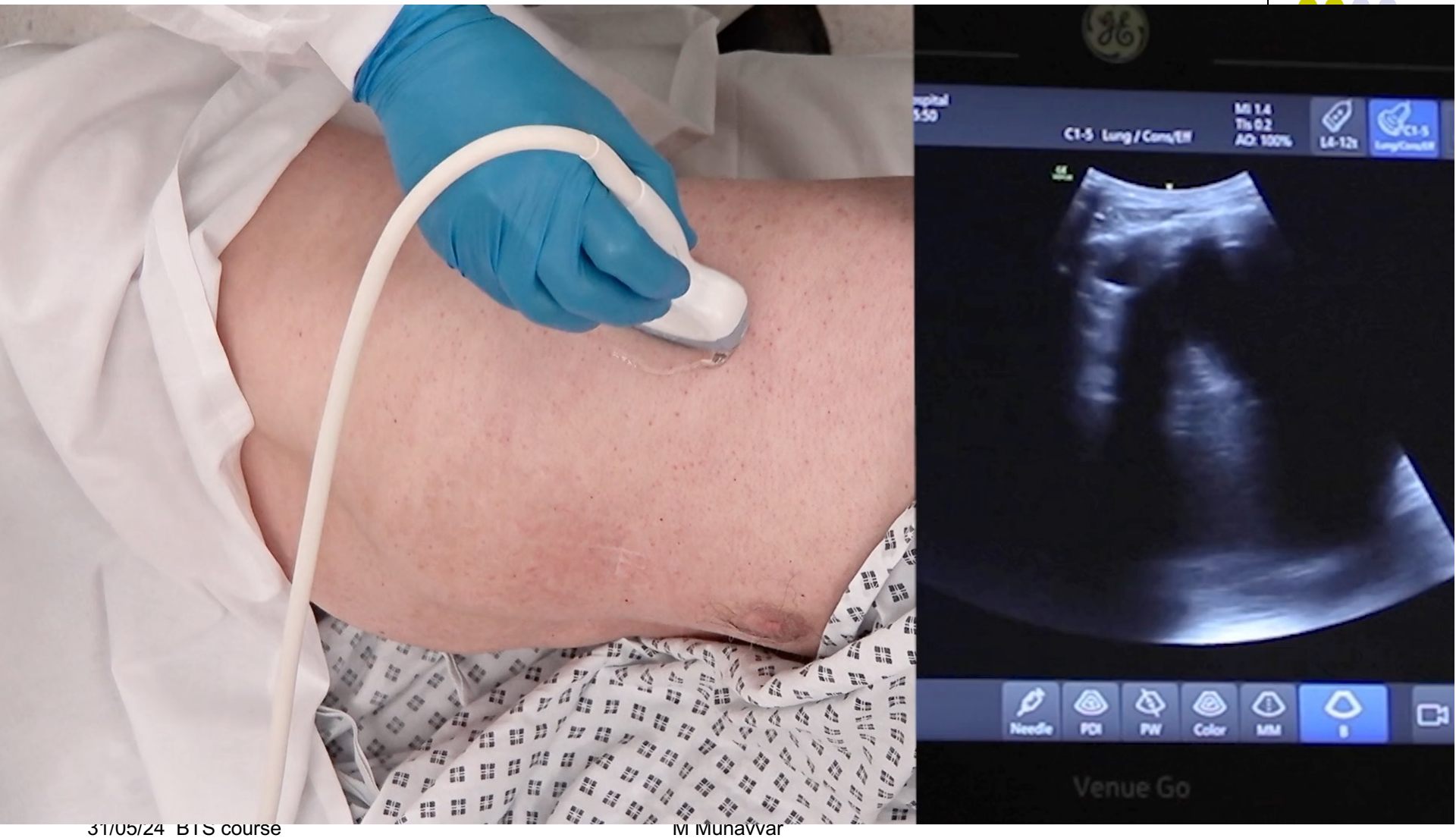
- Single operator
- Single puncture
- 10mm (8.4mm) trocar- mid-axillary line
- Lateral decubitus position
- SpO2 monitoring- nasal cannula oxygen

Procedure

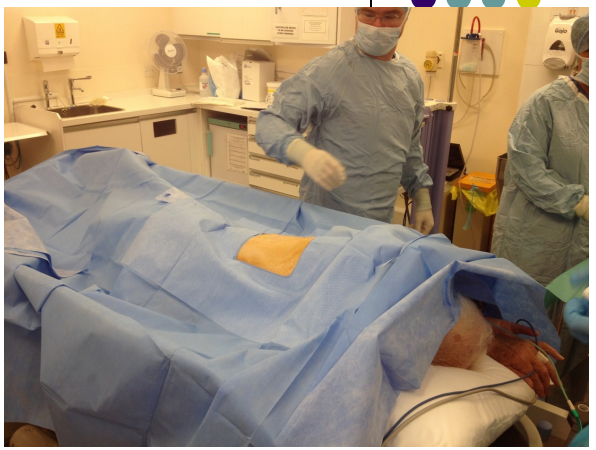
- Pleural fluid drained to dryness
- Pleural surfaces examined
- Parietal pleural biopsies (FB-240K-oval fenestrated with needle- Olympus)
- Talc poudrage (Novatech- sterilised talc) where appropriate
- 24 F drain inserted
- Drain removed after re-expansion- 24 to 48hrs

- *In some instances, an IPC is placed (Reddy et al CHEST 2011)*

US- on the table!



Position- Sterility



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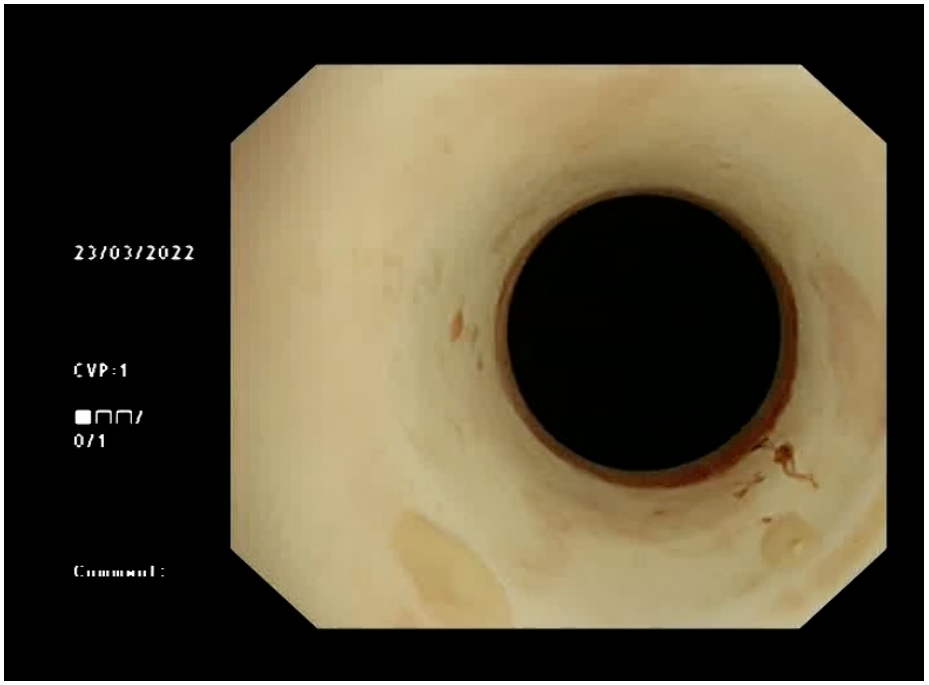
Sedation/ Local Anaesthesia/ Blunt Dissection/ Trocar insertion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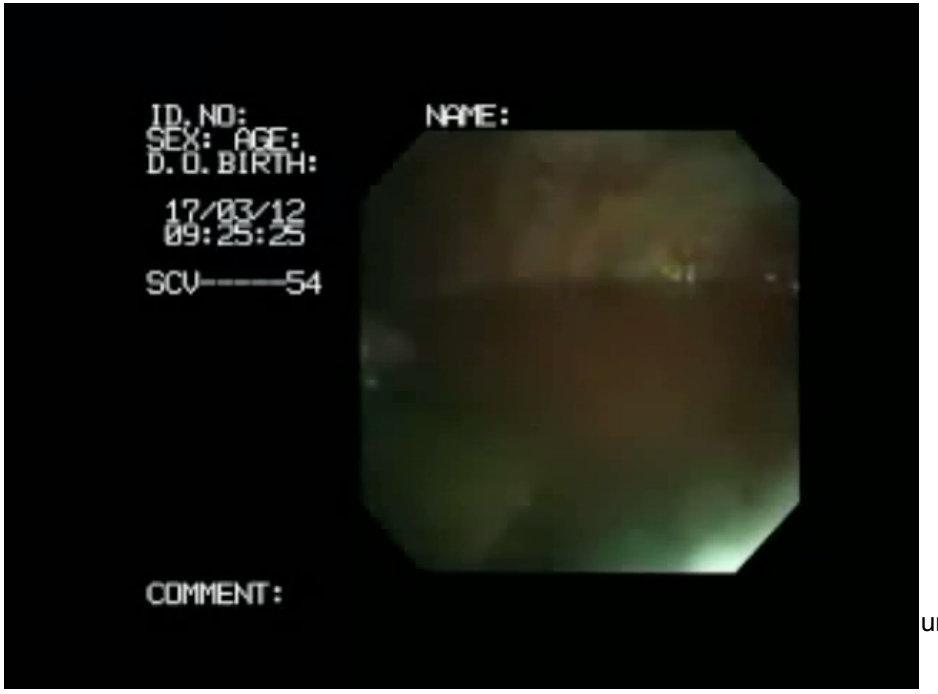
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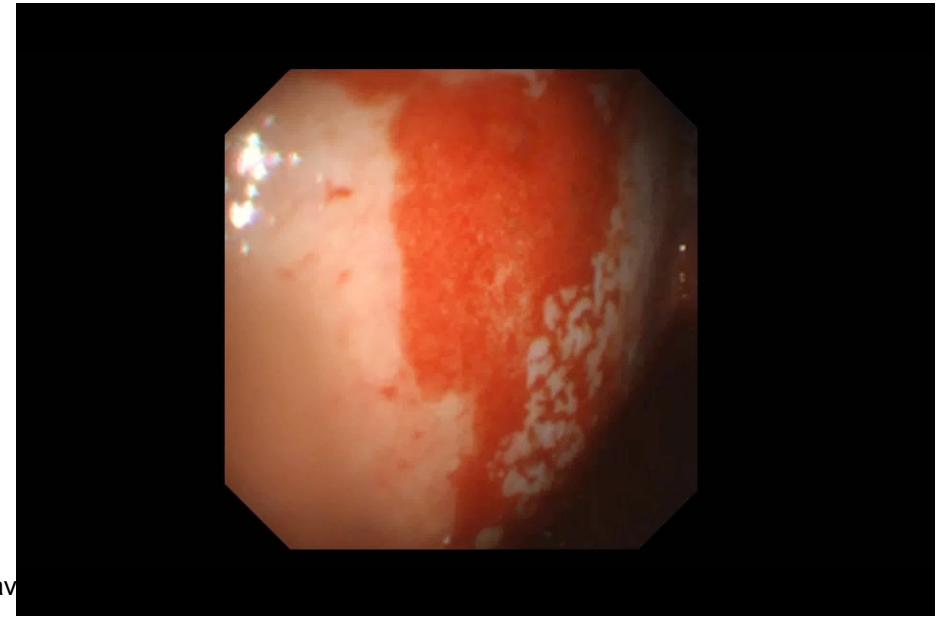

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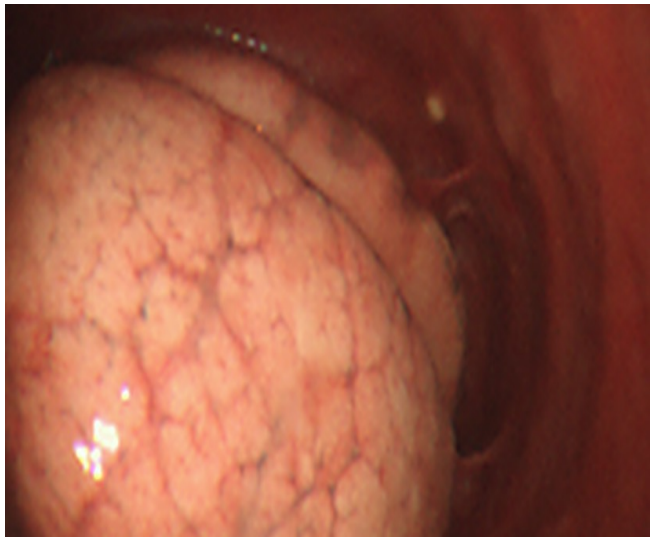
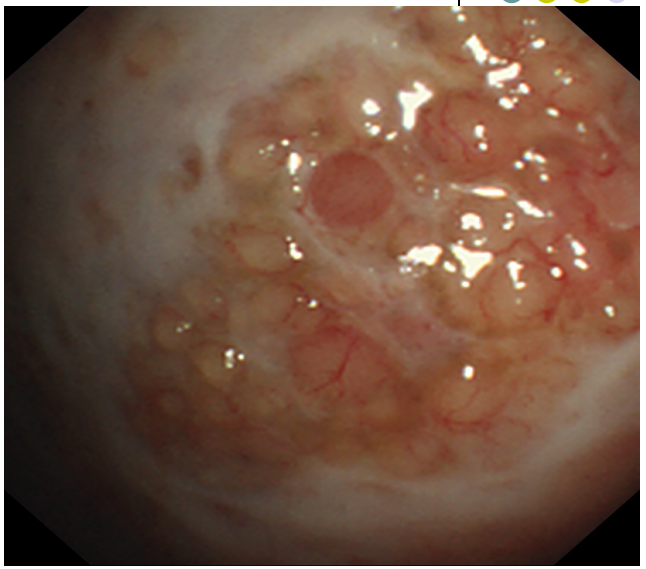
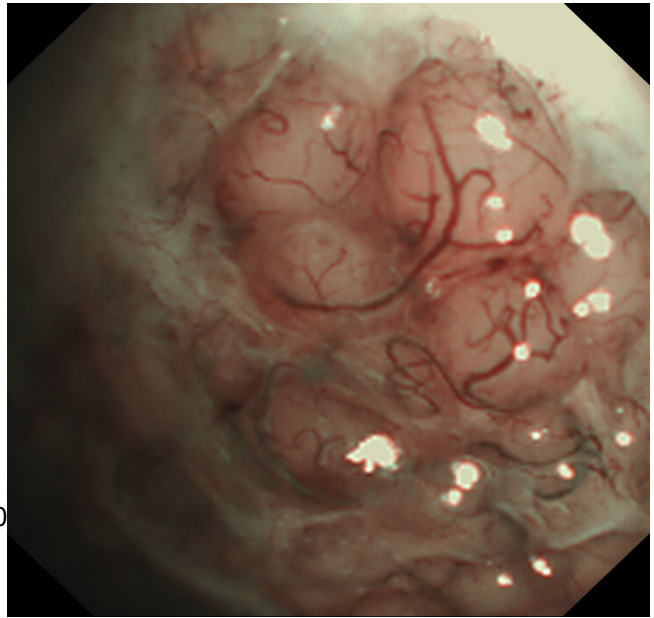
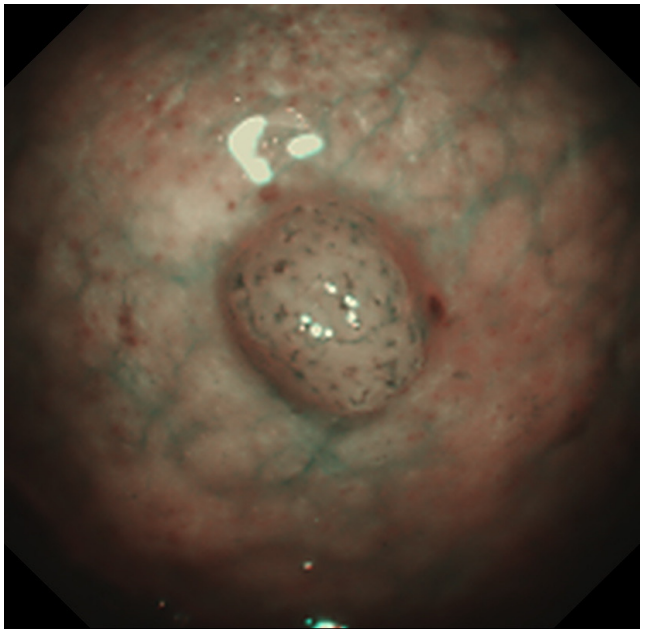
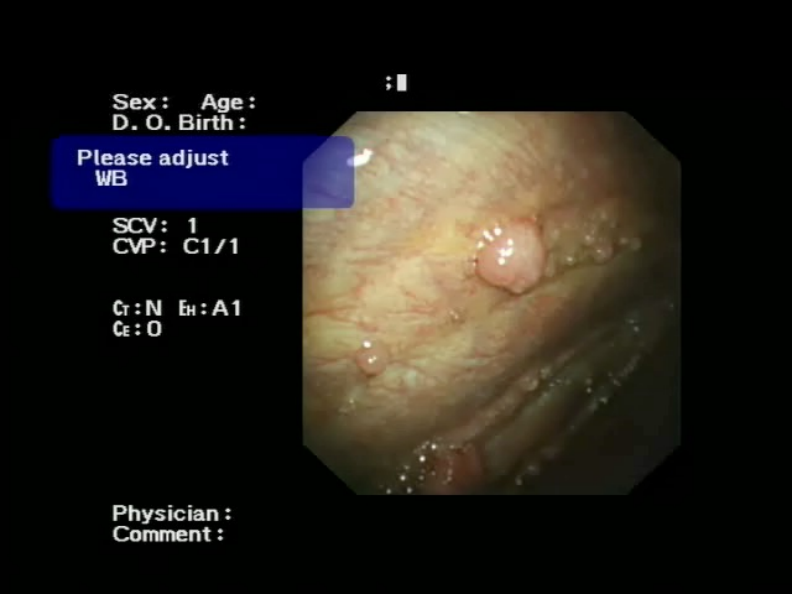
WL and NBI

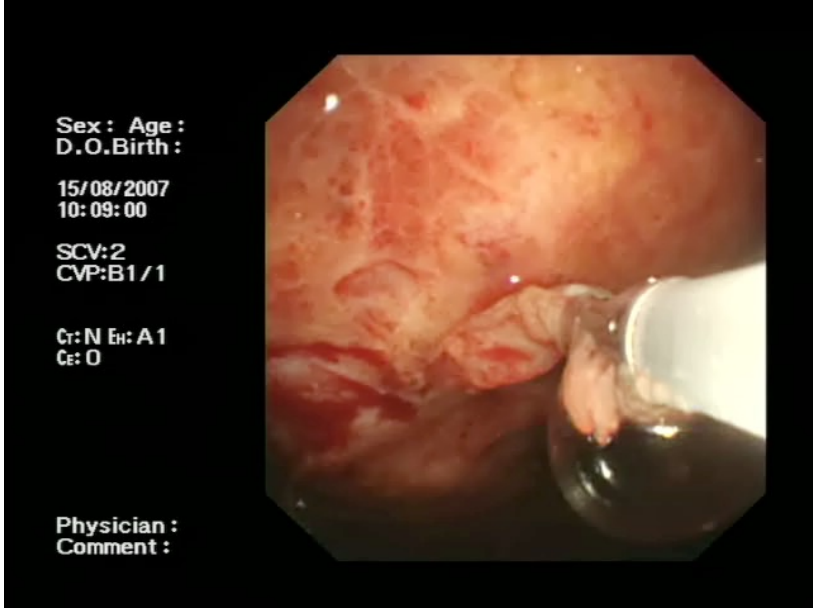




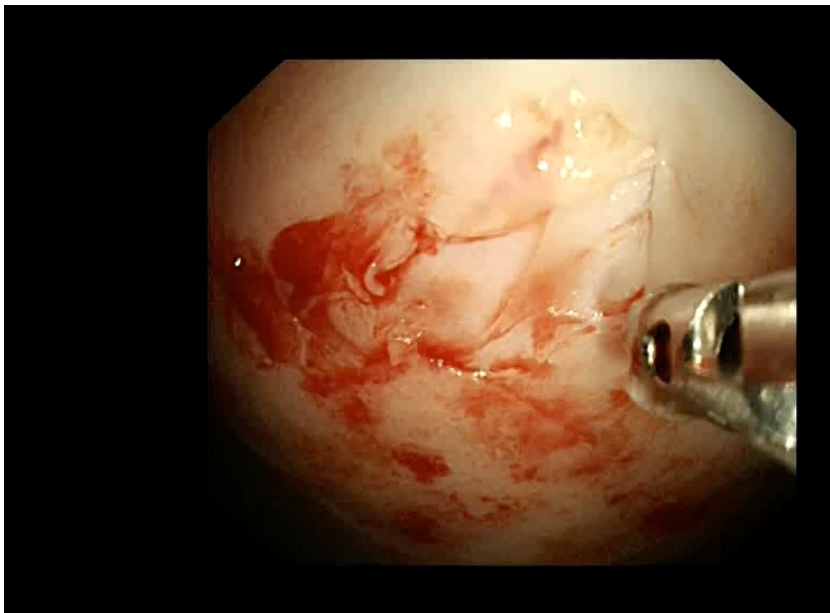








Pinch and Peel!



NBI

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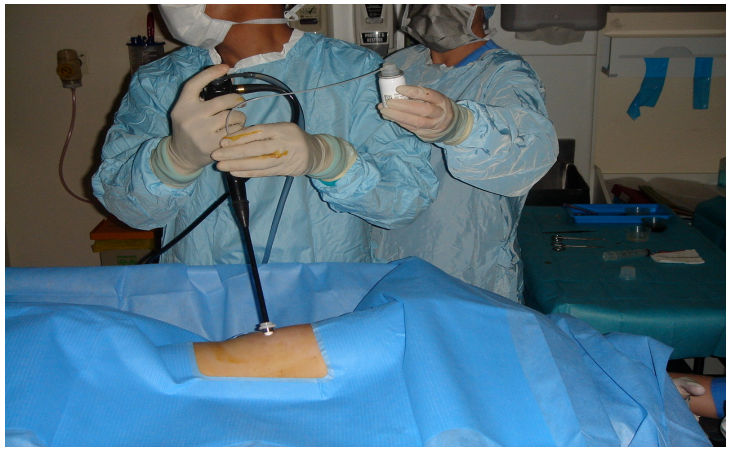
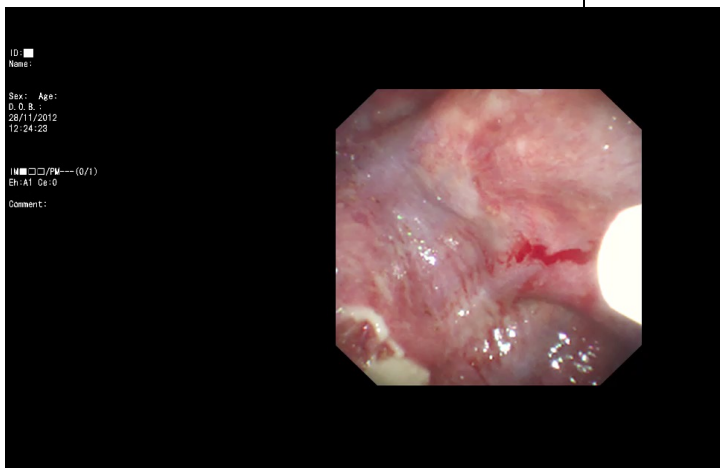
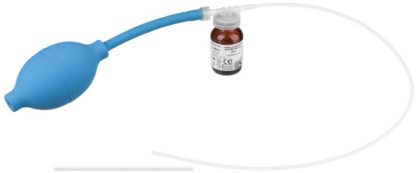
Thoracoscopic Talc Poudrage

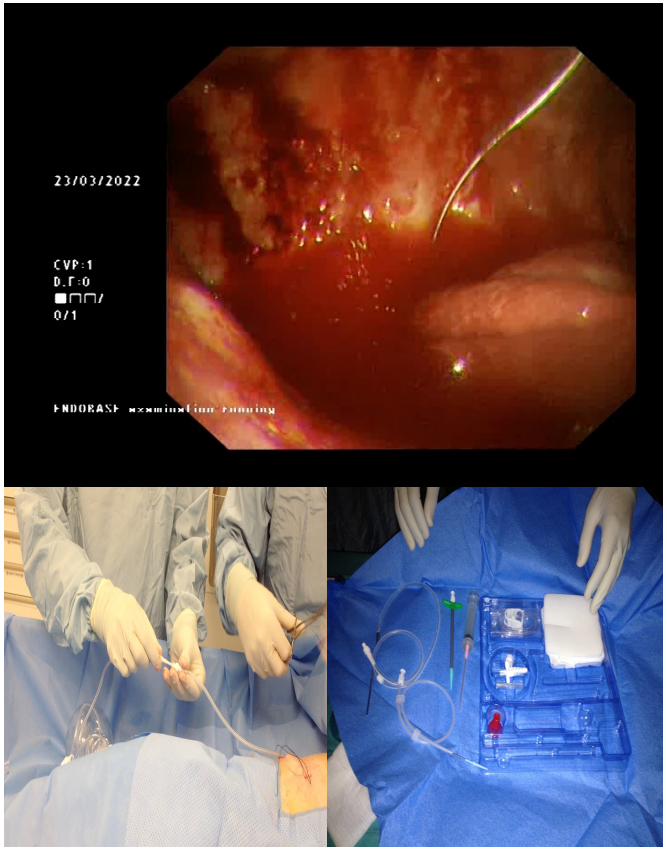


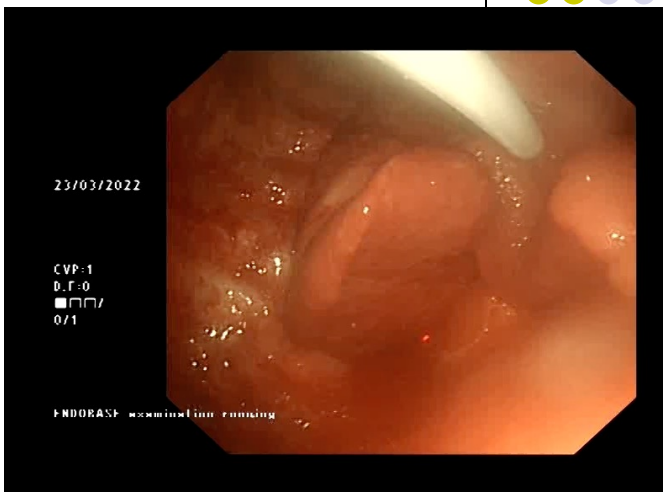


Poudrage with STERITALC® PF3



Post Thoracoscopy Chest Drain + IPC





- Trapped Lung
- TACTIC Trial

TACTIC
IRAS ID 289120

NHS
North Bristol
NHS Trust

The Randomised Thoracoscopic Talc Poudrage + Indwelling Pleural Catheters versus Thoracoscopic Talc Poudrage only in Malignant Pleural Effusion Trial

(TACTIC)

TACTIC

- Reddy C et al CHEST June 2011

TACTIC
IRAS ID 289120

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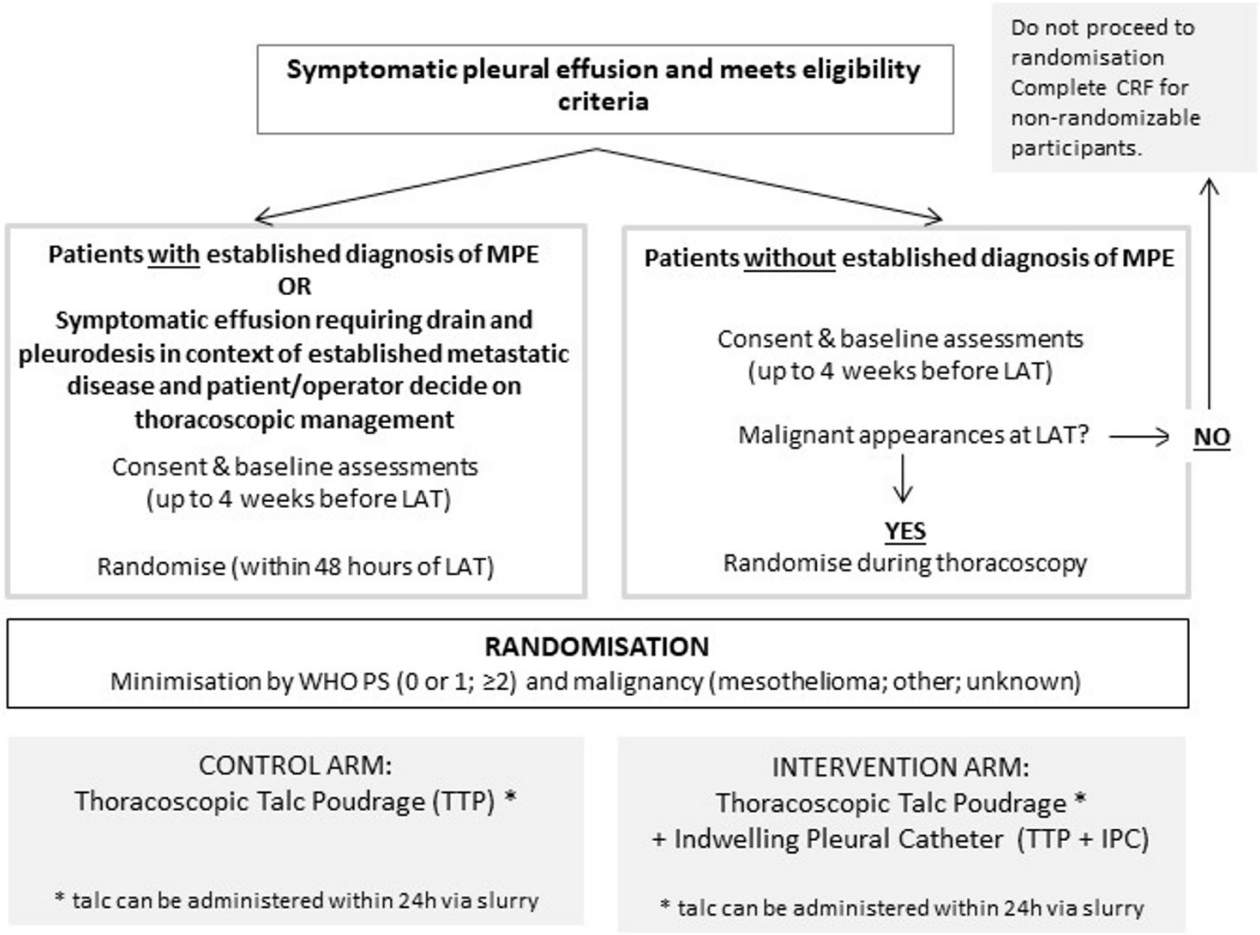
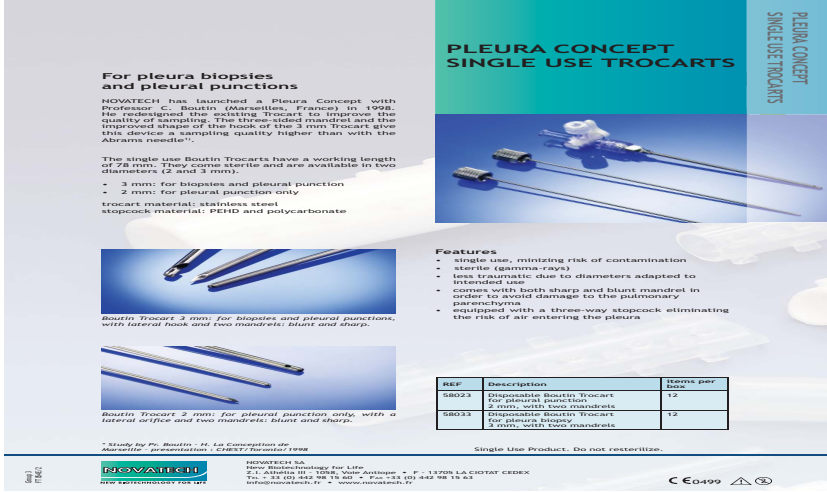
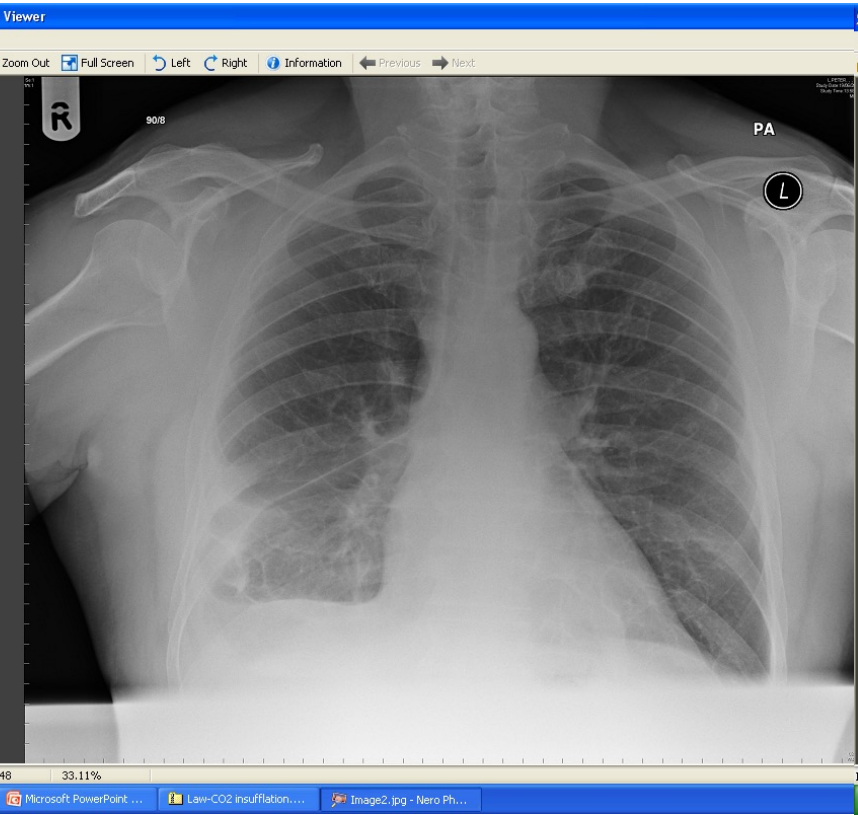
The Randomised Thoracoscopic Talc Poudrage + Indwelling Pleural Catheters versus Thoracoscopic Talc Poudrage only in Malignant Pleural Effusion Trial

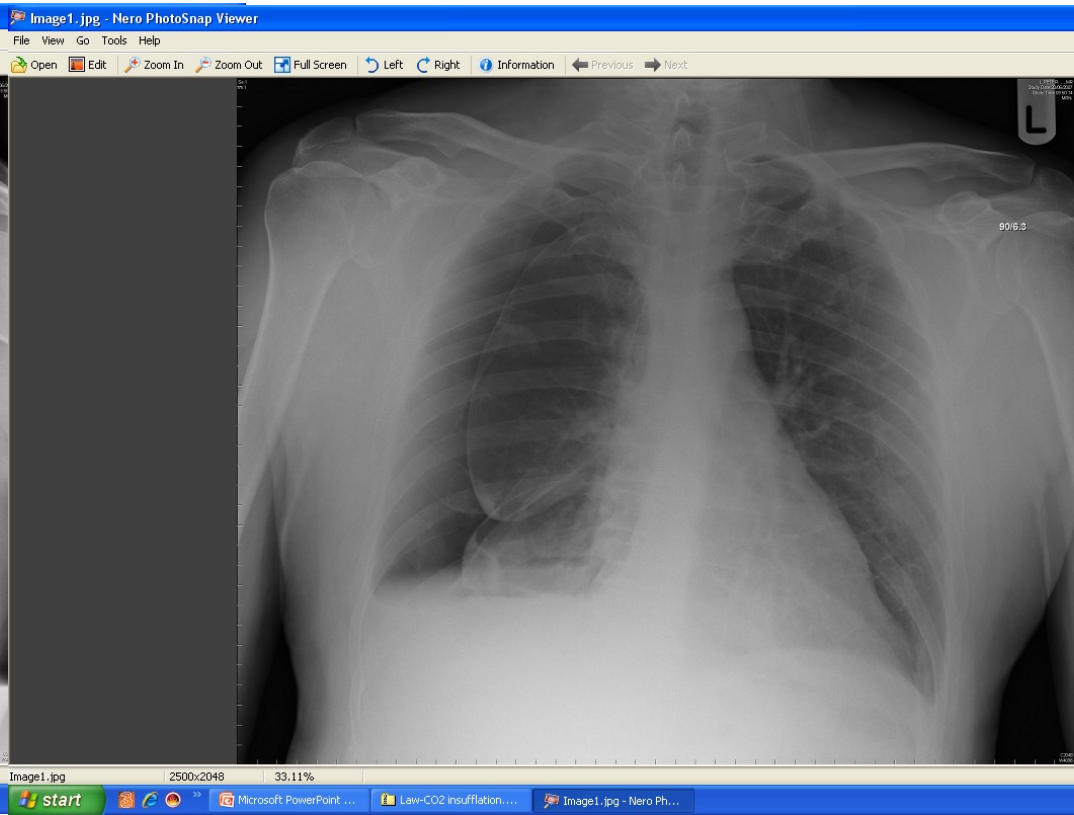
(TACTIC)



Small effusions/thickening



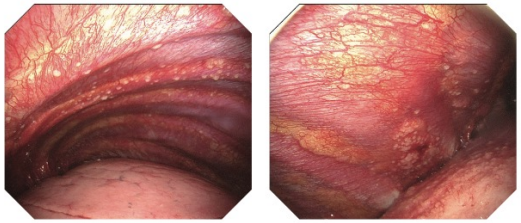




LTF-H290

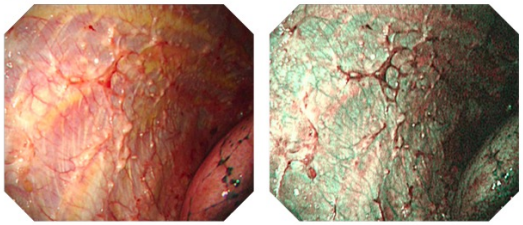
Bright, Clear Observation with HD Imaging

With high quality sensor, the LTF-H290 delivers clearer, brighter images, contributing to more reliable observation, diagnosis and treatment in the thoracic cavity.



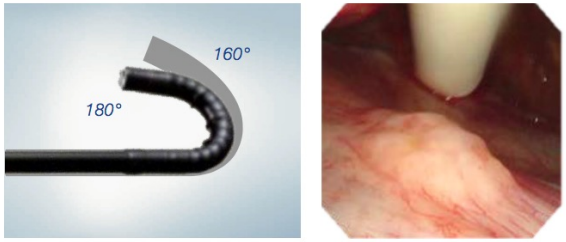
NBI Compatibility

When combined with the Olympus video system, the LTF-H290 offers NBI (Narrow Band Imaging) observation, providing enhanced imaging of the surface of pleura and vascular structures for more accurate observation.



Wide Angulation Range

A 180° UP angulation range gives you control over the scope inside the thoracic cavity and makes it possible to observe lesions close to the trocar.



*Comparison between LTF-H290 (180°) and conventional scopes (160°) as below.

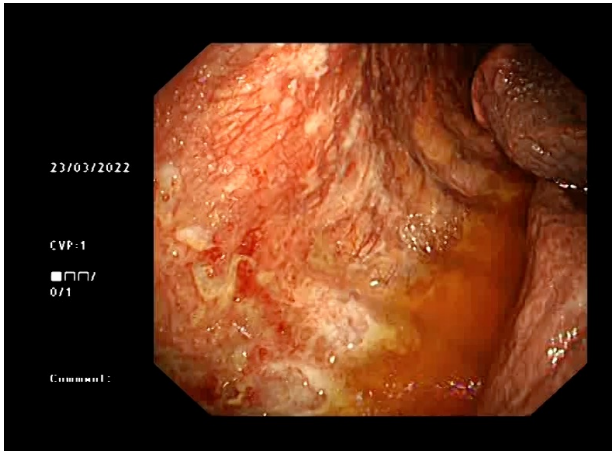
- EVIS PLEURA VIDEOSCOPE OLYMPUS LTF TYPE 240
- EVIS LUCERA PLEURA VIDEOSCOPE OLYMPUS LTF TYPE 260
- EVIS EXERA PLEURA VIDEOSCOPE OLYMPUS LTF TYPE 160

Large 3.0 mm-Diameter Channel

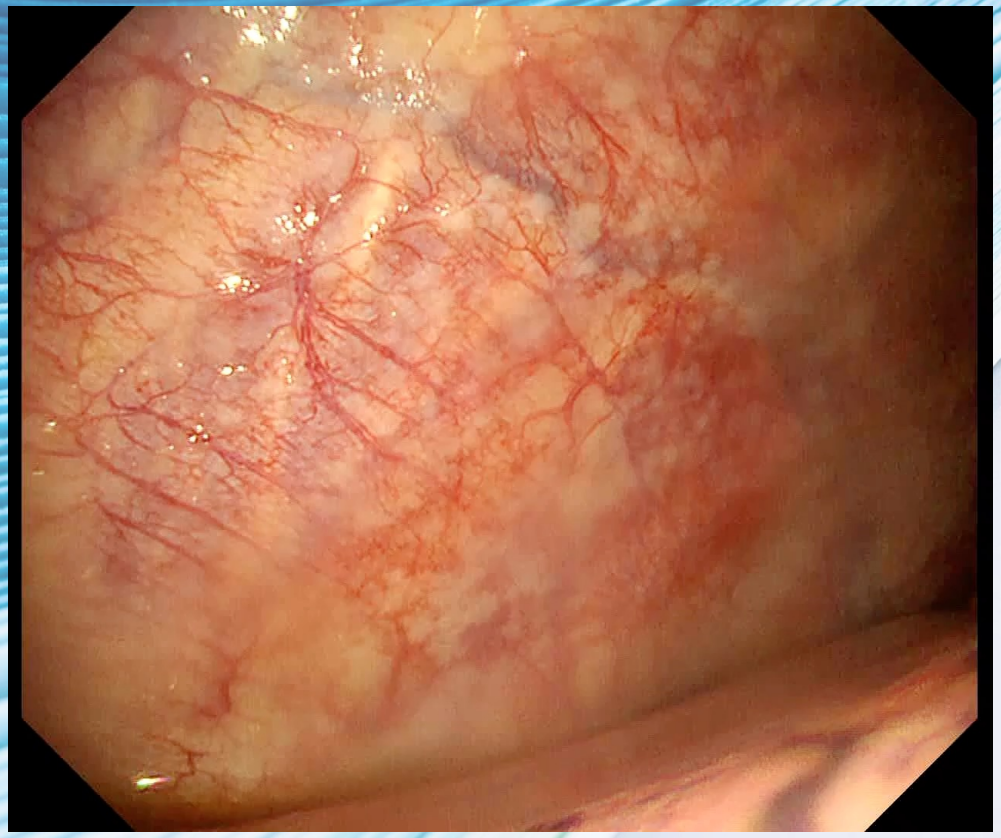
The LTF-H290 is equipped with a large 3.0 mm diameter working channel, that helps maintain a clearer view during the suction of pleural fluid or blood after biopsy.

One Touch Connector

Designed to work with the Olympus video system, the LTF-H290 is equipped with a unique one-touch connector that improves operability by making it easier to connect to the processor.



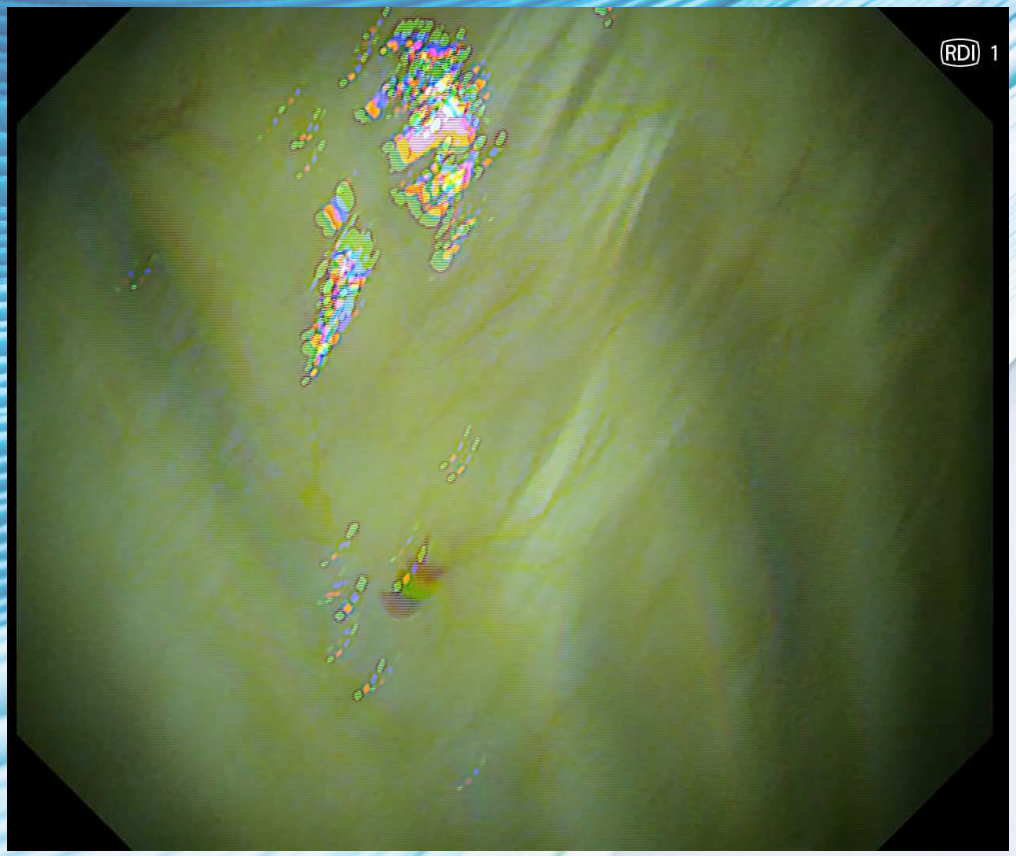
White light vs. TXI (Texture and Color Enhancement Imaging)



Features with X1 processor

Ales Rozman, Slovenia

NBI (Narrow Band Imaging) vs. RDI (Red Dichromatic Imaging)



Features with X1 processor

Ales Rozman, Slovenia

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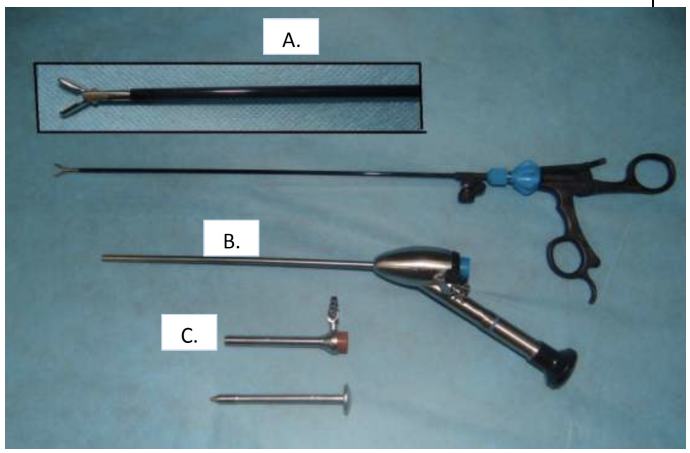
- > 100 years



- 10 years

Thoracoscopes

- >15 years

Specifications

Optical System	Field of view	120°
	Direction of view	Forward viewing
	Depth of field	7 - 100 mm
Insertion Section	Distal end outer diameter	ø 7.3 mm
	Distal end enlarged	Instrument channel outlet; Up; Light-guide lens; The outer diameter of bending section connecting pipe; Right; Left; Objective lens; Down
	Rigid section outer diameter	ø 7.0 mm
	Insertion section working length	270 mm
Instrument Channel	Channel inner diameter	3.0 mm
	Minimum visible distance*1	3 mm
	Direction from which EndoTherapy accessories enter and exit the endoscopic image	

*1 Distance from the distal end of the endoscope.

Bending Section	Angulation range	Up 180° / Down 130°
Total Length	540 mm	
Compatible System	EVIS LUCERA ELITE VIDEO SYSTEM CENTER OLYMPUS CV-290 / EVIS LUCERA ELITE XENON LIGHT SOURCE OLYMPUS CLV-290, CLV-290SL	

EVIS LUCERA ELITE PLEURA VIDEOSCOPE OLYMPUS LTF-H290

Specifications, design and accessories are subject to change without any notice or obligation on the part of the manufacturer.

OLYMPUS

OLYMPUS MEDICAL SYSTEMS CORP.
Shinjuku Monolith, 2-3-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo 163-0914, Japan
www.olympus-global.com

Global Professional Education website
www.olympusprofed.com

- New!!!!

Conclusions- Semirigid Thoracoscopy

- Suitable training of medical and nursing staff
- Select- patients carefully
- Simulation training
  - in the procedure and
  - management of severe complications
- Safety check list- WHO check list and ‘time out’
- Sterility- Aseptic technique (Prophylactic A/Bs?)
- Sedation/ analgesia (adequate LA)
- Specialist operators only (limit the number)
- Sonography- on the table
- SOP- Bleeding protocol

Many thanks for your kind attention!