

## THE LATEST GENERATION OF FLEXIBLE BRONCHOSCOPES

A user's perspective



### Abstract

Bronchoscopy involves the examination of different segmental and sub-segmental bronchi in order to obtain samples to make a diagnosis. The procedure requires the operator to manually manoeuvre the bronchoscope by rotating the scope, which can frequently lead the bronchoscopist to move into unnatural positions while flexing the hand.

As a result, it can be challenging to enter some bronchi due to difficult angulation and potentially, increased fatigue for the operator. It also makes it challenging for an assistant to access the working channel to administer drugs and introduce endotherapy instruments. The latest Olympus bronchoscopes come with an insertion tube rotation function, which allows the operator to rotate the bronchoscope without having to twist their wrists. This enables the bronchoscopist to maintain the scope in a natural position that is convenient, allowing easy insertion of instruments whilst minimising fatigue. Additionally, it provides the assistant with easier access to the working biopsy port to help introduce local anaesthesia, saline and accessories.

### The challenges

While performing a bronchoscopy, the operator will explore different segmental bronchi to enable

visualisation and sampling. This involves rotating the scope and adjusting the angulation control along with back and forth movement of the hand and arm. Access to the sub-segmental level is sometimes necessary to obtain samples where the lesion lies peripherally. Using a conventional bronchoscope requires rotating and twisting multiple times to gain access to the distal bronchioles, which can often be arduous. Bronchoscopists are conditioned to having to twist their wrists and arms into awkward positions to maintain smooth entry of the bronchoscope into the distal airways (Fig 1). Alternatively, the bronchoscopist needs to change position to ensure their hand and arm is straight enough to continue advancing the bronchoscope into the airways.



Figure 1. Example of when the bronchoscopist is required to rotate and twist their wrist in an awkward position, to access difficult to reach lung segments.

During the procedure, it is also important to keep the working channel at an angle that is approachable for the operator or the assistant. The position of the working channel alters along with the changing position of the bronchoscopist, meaning it can rest at inconvenient positions, making it difficult to deliver drugs and instruments via the biopsy port. On the other hand, the continued flexing of the bronchoscopist's hand and arm leads to increased strain if the position is kept at an unnatural position for longer intervals, especially during prolonged procedures. These processes are more pronounced in accessing challenging areas such as the right upper lobe bronchi.

Various new procedures, such as radial EBUS guided biopsy, navigational bronchoscopy, and bronchoscopic lung volume reduction using coils and valves, are becoming increasingly common, and require longer intubation periods. To facilitate the deployment of these advanced technologies accurately, the bronchoscope needs to be maintained at a specific angle. This can be extremely challenging with a conventional bronchoscope as the user is required to maintain an unnatural position for prolonged periods.

## Understanding the product's design

The new EVIS LUCERA ELITE generation of flexible video bronchoscopes includes various modifications, to improve on the EVIS LUCERA SPECTRUM bronchoscopes (see table). The latest Olympus range of bronchoscopes incorporates a rotation function that rotates the distal end of the scope left or right up to 120 degrees. Using this feature, the distal end of the scope can be maintained straight in the neutral position and the proximal control section can be rotated. Located under the broader control section of the bronchoscope is a simple turning ring, which allows the bronchoscopist to manually rotate the flexible distal end of the scope left or right (Fig 2). The new generation of bronchoscopes also incorporates greater upward tip flexibility of 210 degrees, a 30 degree increase compared to previous Olympus bronchoscopes. This increased upward flexibility, combined with the rotation function, offers users greater manoeuvrability with the latest Olympus generation of bronchoscopes.

Comparison of EVIS LUCERA ELITE Generation to EVIS LUCERA SPECTRUM bronchoscopes											
Model	BF-290 Series					BF-260 SERIES					
	BF-H290	BF-1TQ290	BF-Q290	BF-P290	BF-XP290	BF-XP260F	BF-P260F	BF-260	BF-F260	BF-6C260	BF-1T260
Type	HDTV	Hi-Res	Hi-Res	SD	SD	Hybrid	Hybrid	SD	SD	HDTV	SD
Field of View (°)	120	120	120	110	110	90	120	120	120	120	120
Depth of View (mm)	3.0-100	2.0-100	2.0-100	2.0-50	2.0-50	2.0-50	3.0-50	3.0-100	3.0-100	2.0-100	3.0-100
Insertion Tube Outer Diameter (mm)	6	5.9	4.8	4.1	2.8	2.8	4.4	4.9	5.4	5.7	6
Distal End Outer Diameter (mm)	5.7	6	4.9	4.2	3.1 2.9 tapered part	2.8	4	4.9	5.5	5.9	5.9
Channel Inner Diameter (mm)	2	3	2	2	1.2	1.2	2	2	2	2	2.8
Angulation Range (°Up/°Down)	210/130	180/130	210/130	210/130	210/130	180/130	180/130	180/130	180/130	180/130	180/130
Insertion Tube Rotation Function	✓	✓	✓	✓	✓	X	X	X	X	X	X
High Frequency Compatibility	✓	✓	✓	✓	X	X	X	✓	✓	✓	✓

## How the BF-290 series bronchoscopes 'meet the challenge'

The rotation function is a novel technology and is new for many bronchoscopists who are more familiar with the conventional bronchoscopes. The overwhelming majority of users are accustomed to manoeuvring the scope without using the rotation function and achieving the results with greater fatigue and discomfort. Thanks to this novel feature, manoeuvring the bronchoscope is possible with less wrist movement or twisting.

The rotation function allows the bronchoscopist to hold the scope in a more comfortable position and at the same time, experience easier access to difficult to

reach segments. To add more flexibility, the increased distal tip flexion of 210 degrees further enhances scope handling. It enables the user to comfortably enter the segments that usually require a large amount of angulation, such as apical segments of the upper lobe and superior basal segments of the lower lobe.

The insertion tube can be rotated left or right up to 120 degrees, by simply turning the ring on the control section without holding the scope at an angle (Fig 2 & 3). The manipulation of the scope also allows the instrument biopsy port to face the assistant to conveniently insert endotherapy devices such as forceps and brushes.

### A: Rotate Left 120°



### B: Rotate Straight



### C: Rotate Right 120°



Figure 2. By simply turning the control ring, the distal end of the scope can be rotated left (A) or right up to 120° (C).



Figure 3. The insertion tube rotation function.

## Experiences as a new user

It takes a little time for the user to become accustomed to the new technique, as it is not unusual to follow the old reflexes and perform bronchoscopy procedures in the conventional way. It can also be slightly disorienting for the operator, as images on the screen would also rotate along with rotation of the scope. However, after a few procedures, it becomes second nature for an experienced bronchoscopist to become familiar with the new feature.

Conversely, there might not be any issues for somebody who starts learning with the newer technique from the very beginning. The technique rewards instantly with less fatigue and better handling of the scope to support smoother access to the peripheral bronchi. The rotation function makes the biopsy port easily accessible for nurses when administering drugs or when assisting with inserting endotherapy devices.

“ In my experience, it is very easy and rewarding to familiarise yourselves with the rotation function, as it does not require any further training and barely a few procedures to feel comfortable with using the feature.

I would highly recommend the use of these latest Olympus bronchoscopes to my colleagues who would certainly benefit from its new rotation function allowing easier and smoother procedures without undergoing any trouble or training. ”



## Conclusion

The latest Olympus ELE bronchoscopes with the insertion tube rotation function and increased distal tip flexion offer improvements on traditional bronchoscope features. Overall, it facilitates easier handling and better manoeuvrability. The wider angulation range and insertion tube rotation function offer the most significant design improvements. It supports easier operation and smoother insertion with less operator fatigue.

The rotation function facilitates easier access to the biopsy port when introducing drugs and accessories.

## Written with kind thanks by:

### Dr Usman Maqsood

Senior Clinical Fellow in Interventional Pulmonology  
Royal Preston Hospital, Lancashire Teaching Hospitals

### Dr Mohammed Munavvar, MD, DNB, FRCP

Consultant Chest Physician & Interventional Pulmonologist  
Clinical Director in Respiratory Medicine  
President-Elect, European Association for Bronchology & Interventional Pulmonology  
Royal Preston Hospital, Lancashire Teaching Hospitals

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**OLYMPUS**

### OLYMPUS KEYMED

KeyMed House, Stock Road, Southend-on-Sea, Essex, SS2 5QH, UK  
Telephone: +44 (0)1702 616333  
e-mail: info@olympus.co.uk website: www.olympus.co.uk