



Wide Area Transepithelial Sampling (WATS^{3D}) Detects Barrett's Metaplasia Missed by Forceps Biopsies After Ablation of Short and Long Segment Disease

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BACKGROUND

• Barrett's Esophagus (BE) is a pre-malignant condition characterized by goblet cell metaplasia in the tubular esophagus

• Radiofrequency ablation (RFA) and liquid nitrogen spray cryotherapy (LN2SC) are used for endoscopic BE ablation

• The current standard of care for post ablation surveillance includes 4 quadrant forceps biopsies (FB) at least every 2 centimeters (cm) throughout the original BE segment, even though this leaves a large percentage of tissue unsampled

• WATS^{3D} is a promising technique that allows for more extensive sampling across a mucosal surface area using a brush device

• Prior studies demonstrated the benefit of adjunctive use of WATS^{3D} with FB to improve detection of both BE and dysplasia^{1,2,3}

• Early data also suggest a role for WATS^{3D} in surveillance following endoscopic BE ablation⁴

OBJECTIVE

• Evaluate the benefit of WATS^{3D} as an adjunctive sampling technique with FB for post-ablation surveillance of both short segment BE (SSBE) and long segment BE (LSBE)

METHODS

- 40 patients had no evidence of BE on visual inspection with high definition white light or narrow band imaging during follow-up endoscopy after RFA or LN2SC between January 1, 2012 and December 1, 2012
- WATS^{3D} brush biopsies were obtained using the standard 2-brush technique, and samples were sent to a central laboratory (CDx Laboratories, Suffern, NY) for analysis using a 3-Dimensional neural network based computer system
- 4 quadrant FB then were obtained every 1 cm following a modified Seattle protocol, and specimens were reviewed by Temple's expert GI pathologist
- Results from both data sets of samples were compared

PATIENT DEMOGRAPHICS AND FINDINGS

Case	Gender	Age	Original Dysplasia Grade ¹	Original BE Length ^{2,3}	Ablation Method ⁴	FB Results ⁵	WATS ^{3D} Results ⁵	
1	F	48	NDBE	COM3	LSBE	RFA	Negative	Negative
2	M	76	LGD	COM1	SSBE	RFA	NDBE	Negative
3	F	48	LGD	COM1	SSBE	RFA	NDBE	NDBE
4	F	55	NDBE	C9M9	LSBE	RFA	Negative	Negative
5	M	80	HGD	COM3	LSBE	RFA	Negative	Negative
6	M	55	HGD	C9M9	LSBE	LN2SC	Negative	NDBE
7	M	64	LGD	COM2	SSBE	RFA	Negative	Negative
8	M	65	HGD	COM5	LSBE	RFA	Negative	NDBE
9	M	68	HGD	C8M8	LSBE	RFA	Negative	Negative
10	F	75	HGD	COM1	SSBE	RFA	Negative	Negative
11	M	42	NDBE	COM1	LSBE	LN2SC	Negative	Negative
12	M	67	NDBE	COM3	LSBE	RFA	NDBE	Negative
13	F	70	HCD	COM5	LSBE	RFA	Negative	Negative
14	M	50	HCD	C4M5	LSBE	RFA	Negative	Negative
15	F	66	Indefinite	COM1	SSBE	RFA	Negative	Negative
16	M	43	Indefinite	COM1	SSBE	RFA	Negative	Negative
17	F	36	NDBE	C4M4	LSBE	LN2SC	Indefinite	Negative
18	M	73	HCD	C2M5	LSBE	RFA	Negative	Negative
19	F	50	LGD	COM1	SSBE	RFA	NDBE	Negative
20	M	71	Indefinite	COM1	SSBE	RFA	Negative	Negative

1. NDBE: Non-dysplastic BE; LGD: Low Grade Dysplasia; HGD: High Grade Dysplasia
2. Prague Classification Score: C (length in cm of circumferential BE) and M (maximum BE length in cm)
3. SSBE: Short Segment Barrett's Esophagus; LSBE: Long Segment Barrett's Esophagus
4. RFA: Radiofrequency Ablation; LN2SC: Liquid Nitrogen Spray Cryotherapy
5. Negative: No goblet cell metaplasia seen; NDBE: Non-dysplastic BE; BE/Indefinite: BE Indefinite for Dysplasia

Case	Gender	Age	Original Dysplasia Grade ¹	Original BE Length ^{2,3}	Ablation Method ⁴	FB Results ⁵	WATS ^{3D} Results ⁵	
21	M	56	NDBE	C6M8	LSBE	RFA	Negative	Negative
22	M	55	HGD	C9M9	LSBE	LN2SC	NDBE	Negative
23	M	75	HGD	COM1	SSBE	RFA	Negative	NDBE
24	M	59	LGD	C1M5	LSBE	RFA	Negative	Negative
25	M	66	HGD	COM3	LSBE	LN2SC	Negative	NDBE
26	F	73	NDBE	COM5	LSBE	RFA	NDBE	Negative
27	M	42	NDBE	COM1	SSBE	LN2SC	Negative	Negative
28	M	52	NDBE	C2M5	LSBE	RFA	Negative	Negative
29	M	80	HGD	COM3	LSBE	RFA	Negative	Negative
30	M	68	HGD	C8M8	LSBE	RFA	Negative	Negative
31	M	65	HGD	COM5	LSBE	RFA	NDBE	Negative
32	F	75	HGD	COM1	SSBE	RFA	Negative	Negative
33	M	67	NDBE	COM3	SSBE	RFA	NDBE	Negative
34	F	70	HCD	COM5	LSBE	RFA	Negative	Negative
35	M	66	HCD	COM1	SSBE	RFA	Negative	Negative
36	M	43	Indefinite	COM1	SSBE	RFA	Negative	Negative
37	M	76	LGD	COM1	SSBE	RFA	NDBE	NDBE
38	M	71	Indefinite	COM1	SSBE	RFA	Indefinite	Negative
39	F	59	NDBE	COM1	SSBE	RFA	Negative	Negative
40	F	73	NDBE	COM5	LSBE	RFA	Negative	Negative

RESULTS

- The study cohort included 27 males (67.5%) and 13 females (32.5%), with a mean age of 62.5 years
- Prior to ablation, 17 (42.5%) patients had SSBE and 23 (57.5%) had LSBE
- Original dysplasia grades included 17 (42.5%) HGD, 6 (15%) LGD, 5 (12.5%) indefinite for dysplasia and 12 (30%) NDBE
- Agreement in surveillance biopsy diagnosis between FB and WATS^{3D} was seen in 27 of 40 cases (67.5%)
- FB detected BE in 11 cases (27.5%) and WATS^{3D} detected BE in 6 cases (15%)
- In 4 cases, WATS^{3D} identified BE while FB did not, with adjunctive use of WATS^{3D} increasing overall BE detection by 36.4% (4/11)
- BE was detected in 7 cases of ablated SSBE and 8 cases of ablated LSBE, using either sampling method
- In prior SSBE cases, BE was detected in 2 cases with both FB and WATS^{3D}, 4 with FB alone, and 1 with WATS^{3D} alone
- In prior LSBE cases, BE was detected in 5 cases with FB alone and 3 with WATS^{3D} alone
- Adjunctive WATS^{3D} and FB sampling increased BE yield by 16.7% (1/6) for SSBE cases and 60% (3/5) in LSBE cases

CONCLUSIONS

• WATS^{3D} can detect BE missed by FB during post ablation surveillance of SSBE and LSBE

• In this study the benefit of adjunctive use of WATS^{3D} was greater in patients with ablated LSBE (60%) versus those with ablated SSBE (16.7%)

• Adjunctive wide area brush sampling may be of particular benefit after ablation of long segments of Barrett's esophagus due to larger absolute mucosal surface areas unevaluated by FB

• Additional studies are needed to determine if WATS^{3D} is particularly useful in sampling specific areas such as the esophagogastric junction or tubular esophagus

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