

Safety and efficacy of liquid nitrogen spray cryotherapy (LNSC) in Barrett's neoplasia – a comprehensive review and meta-analysis

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BACKGROUND

- Barrett's esophagus (BE) is a precursor condition to esophageal adenocarcinoma (EAC), resulting in transformation of the squamous epithelium of distal esophagus to columnar-lined epithelium with intestinal metaplasia (IM).
- Liquid nitrogen spray cryotherapy (LNSC) is a noncontact method of BE eradication and has been used both as primary and salvage therapy.
- We conducted a systematic review and metaanalysis to assess the safety and efficacy of LNSC.

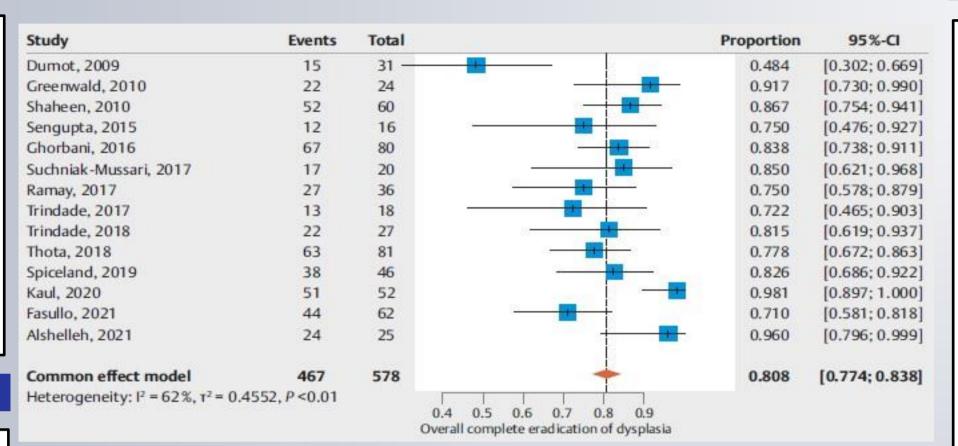
METHODS

- We searched multiple databases from inception through December 2021 to identify studies on use of LNSC for Barrett's neoplasia.
- Pooled estimates were calculated using randomeffects model and results were expressed in terms of pooled proportions with relevant 95% confidence intervals (CIs).

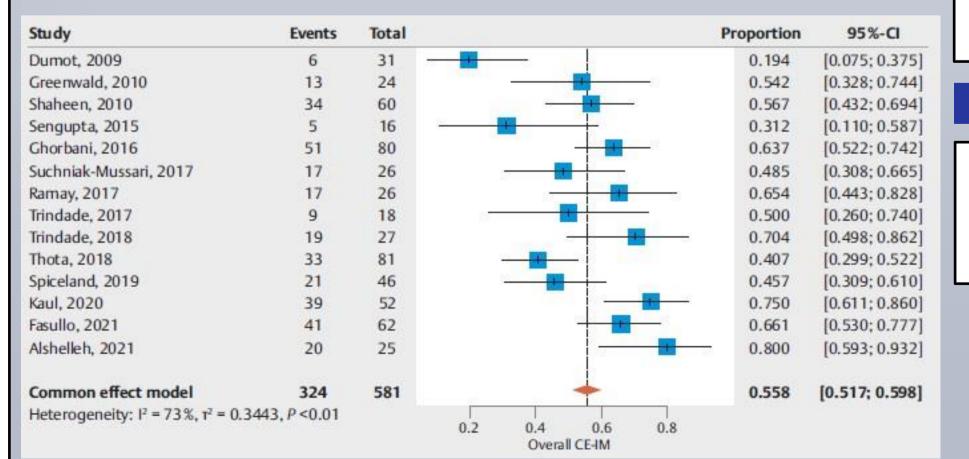
OUTCOMES ASSESSED

- I. Efficacy outcomes
- a) Complete eradication of dysplasia (CE-D)
- b) Complete eradication of high-grade dysplasia (CE-HGD)
- c) Complete eradication of intestinal metaplasia (CE-IM)
- d) Recurrence of dysplasia (RE-D) and intestinal metaplasia (REIM)
- e) Failures (F) defined as persistence of the previously diagnosed IM, dysplasia, or cancer, or progression to worsening dysplasia or cancer
- II. Safety outcomes
- a) Pooled incidence of post therapy strictures
- b) Pooled incidence of post therapy perforation
- c) Pooled incidence of post therapy pain

RESULTS



Study	Events	Total	F	Proportion	95%-CI
Greenwald, 2010	15	17	8 	0.882	[0.636; 0.985]
Shaheen, 2010	58	60		0.967	[0.885; 0.996]
Ghorbani, 2016	52	57	-	0.912	[0.807; 0.971]
Suchniak-Mussari, 2017	14	15	-	0.933	[0.681; 0.998]
Ramay, 2017	32	39	-	0.821	[0.665; 0.925]
Trindade, 2017	5	7		0.714	[0.290; 0.963]
Common effect model	176	195	-	0.903	[0.852; 0.937]
Heterogeneity: $I^2 = 33\%$, $\tau^2 = 0$.1606, P<0.19		0.3 0.4 0.5 0.6 0.7 0.8 0.9 Overall CE-HGD		



RESULTS

- Overall pooled rates of CE-D, CE-HGD and CE-IM were 80.8% (95% CI [77.4–83.8]; I2 62%), 90.3% (CI [85.2–93.7]; I2 33%) and 55.8% (CI [51.7–59.8]; I2 73%), respectively. (▶Fig. 1, 2, 3)
- Among the studies with mean/median follow-up time of greater than 24 months pooled rates of CE-D and CE-IM were 83.6% and 54.7%, respectively.
- In LNSC-naïve patients with prior history of endoscopic resection, overall pooled rates of CE-D and CE-IM were 79.9% (CI [73.3–85.2]; I2 50%) & 67.1% (CI [59.5–73.8]; I20%), respectively.
- Pooled rate of RE-D was 19.2% (CI [14–25.8]; I2 78%) & RE-IM was 14.8% (CI [10.3–20.7]; I2 41%).
- Pooled rate of treatment failure was 23.6% (CI [19.4–28.3]; I2 73%).
- Pooled rate of persistent dysplasia (including HGD and LGD) was 13% (CI [7.8–20.7]; I2 64%), persistent IM, 31.1% (95% CI [23.1–40.5]; I2 83%) and progression to cancer was 6.3% (CI [3–12.6]; I2 7%).
- Pooled rate of post-cryotherapy strictures was 4%, perforation 0.8% and post therapy chest and/or abdominal pain was 10.3%.

CONCLUSION

 Our analysis, the largest one to date, shows that LNSC in patients with BE, including those with prior history of endoscopic resection has acceptable efficacy and safety profile.

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