

## Diagnosis of lateral hypopharyngeal pouches: a comparative study of videofluorography and pseudovalsalva maneuver in double contrast pharyngography

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### Abstract

**Background:** To evaluate the difference between the pseudovalsalva maneuver in double-contrast pharyngography and the videofluorographic swallowing examination in the detection and grading of lateral hypopharyngeal pouches.

**Methods:** Two hundred twenty-seven videofluorographic swallowing examinations and double-contrast pharyngography using the pseudovalsalva maneuver were retrospectively analyzed by two radiologists. The mean age of the patients was 54 years (range = 21–81 years). The examination was performed on a fluoroscopy unit with a U-matic videorecording system in standard projections. Iodinated contrast agent was used, followed by barium if there was no massive aspiration.

**Results:** In contrast to the videofluorographic swallowing examination, which showed 170 lateral hypopharyngeal pouches (113 grade I, 39 grade II, 18 grade III) in 101 patients, the pseudovalsalva maneuver showed 304 pouches (304 grade III) in 179 patients. No videofluorographically diagnosed lateral hypopharyngeal pouches were missed by the pseudovalsalva maneuver; 134 pouches in 78 patients diagnosed with pseudovalsalva maneuver had no correlation videofluorographically.

**Conclusion:** Double-contrast pharyngography using the pseudovalsalva maneuver is not a reliable method for the diagnosis of lateral hypopharyngeal pouches.

**Key words:** Lateral hypopharyngeal pouches—Videofluorographic swallowing examination—Pseudovalsalva maneuver in double-contrast pharyngography.

swallowing [1]. In contrast to diverticula, they are a functional entity. The LHPs appear in the weak spot of the thyrohyoid membrane, where the inferior pharyngeal constrictor muscle and the thyrohyoid muscle fail to overlap because of intrapharyngeal pressure elevation intradeglutively. In this area, the membrane is perforated by the superior laryngeal artery and vein and by the internal branch of the superior laryngeal nerve [2]. Using electron beam tomography, LHPs have been found immediately ventral to the upper horn of the thyroid cartilage, just below the hyoid bone [3]. LHPs are a frequent finding, especially with advancing age [4]. Most LHPs are asymptomatic, but they can cause subjective complaints such as foreign-body sensation, hoarseness, globus, dysphagia, and the urge to swallow again [1, 5–8] and postdeglutitive aspiration with severe symptoms such as aspiration pneumonias and weight loss due to fear of swallowing again [9]. In the literature, diagnosis of LHP is performed by using dynamic imaging modalities such as videofluorography and cinematography in addition to the pseudovalsalva maneuver (PVM) in double-contrast pharyngography [1, 2, 6, 8, 10–17]. Many of these studies have shown photographs of LHP found with PVM [1, 5, 6, 8, 10–13], and some have reported LHP could be diagnosed more easily or demonstrated better with PVM [2, 10–12, 16]. Because videofluorography and cinematography are the methods of choice for imaging of functional pharyngeal disorders, the present study compares the PVM in the detection and grading (Table 1) of LHP with the videofluorographic swallowing examination (VSE).

Lateral hypopharyngeal pouches (LHPs) are transient protrusions of the lateral hypopharyngeal wall during

### Materials and methods

In this retrospective study, 227 VSEs of 117 men and 110 women (age range = 21–81 years, mean = 54 years) were reviewed by two radiol-

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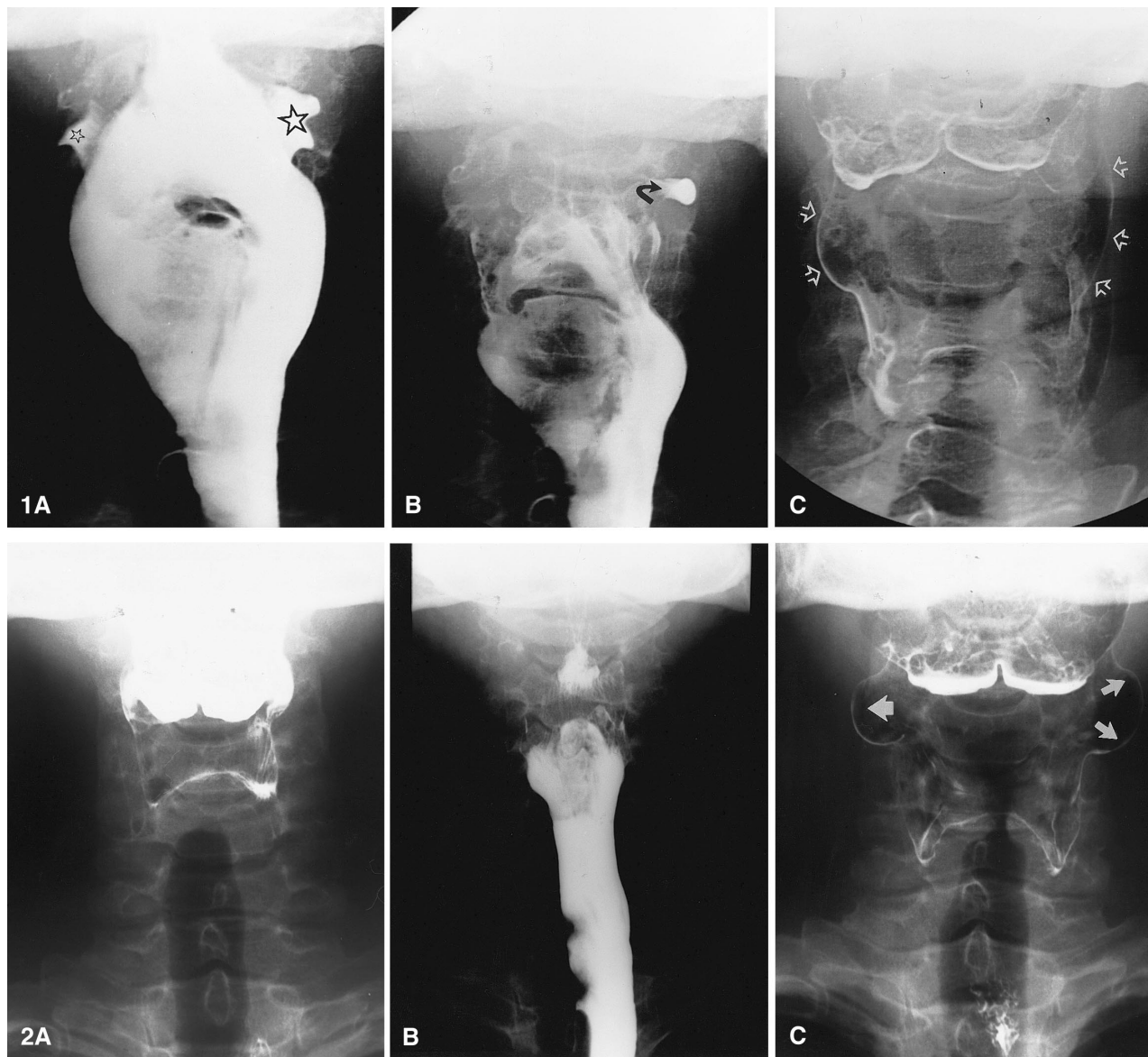
**Table 1.** Classification of lateral hypopharyngeal pouches

Grade	Size (cm)	Filling	Emptying
I	<0.5	Late	Early
II	0.5–1	Relatively early	Relatively late
III	>1	Early	Late

From [18]

ogists. The patients were referred to our department for evaluation of swallowing problems, but only patients without previous surgery to the hypopharynx were included in the study. The VSE was done in standard

projections and was tailored to the specific pathology of the patient [18, 19] on a fluoroscopy unit (Siregraph D3, Siemens, Germany) using a U-matic videorecording system (Vo-5800 PS, Sony, Japan). In all patients, iodinated contrast agent (Jopamidol) was used, followed by application of high-density barium if no or only grade I or II aspiration was present [20]. Double-contrast pharyngography using the PVM was routinely performed for detection of morphologic pathology. During the PVM, a spot film was taken for documentation. The evaluation concerned the frequency of LHPs in videofluorography and of hypopharyngeal pouches (HP) using the PVM. LHPs and HPs were classified into grades I–III. For classification of LHPs, all three parameters were taken into account (Table 1). For HPs, the diameters of circumscribed outpouchings of the hypopharyngeal wall were noted. Nonfocal bulging of the hypopharyngeal wall was not classified as an HP because there



**Fig. 1.** A 56-year-old man with dysphagia. **A** Intradeglutitive phase of swallowing shows LHP grade III on the left and grade I on the right (*stars*). **B** Delayed emptying of the left LHP (*curved arrow*). **C** Pharyngography during PVM demonstrates HP grade III on right and left sides (*open arrows*).

**Fig. 2.** A 42-year-old man with globus and occasional urge to swallow again. **A, B** Intradeglutitive, no LHPs are evident. **C** PVM demonstrates HP grade III on the right and left sides (*arrows*).

could be no weak spot of the thyrohyoid membrane resulting from failure of muscular overlapping.

## Results

Of the 227 patients, the VSE showed LHPs in 101 patients (44.5%), bilaterally in 69 and unilaterally in 32. Of the resulting 170 LHPs, 113 (66.5%) were classified as grade I, 39 (22.9%) as grade II, and 18 (10.6%) as grade III. PVM in double-contrast pharyngography detected HPs in 179 patients (78.9%), bilaterally in 125 and unilaterally in 54. The 304 HPs were classified as grade III (100%). More or less marked nonfocal bulging of the hypopharynx was present in the remainder. In all patients with VSE-diagnosed LHPs, HPs were evident when using the PVM (Fig. 1), but the diameter of the pouches increased significantly. One hundred thirty-four HPs in 78 patients showed no correlation in the VSE (Fig. 2).

## Discussion

LHPs may be significant if they cause subjective or objective symptoms because, in severely symptomatic LHPs, either conservative or surgical treatment has to be performed [8]. The present study shows that there is a great difference between the absolute numbers of LHPs and HPs diagnosed with either VSE or PVM; thus, HPs are much more frequent than LHPs. Moreover, there is no good correlation between the size of an LHP and of an HP; thus, there is a shifting from a low-grade LHP to a high-grade HP. In cases of VSE-detected LHP, the physiologically or pathologically increased hypopharyngeal pressure makes the thyrohyoid membrane bulge during swallowing. In contrast, the PVM provokes an elevated mesohypopharyngeal pressure without any correlation to the physiologic swallowing pressure. This study shows that LHPs should be diagnosed with a physiologic examination technique such as the videofluorographic or cinematographic swallowing examination. It is not possible to diagnose LHP with a static and unphysiologic method such as PVM in double-contrast pharyngography, but this method remains important for the detection of anatomic or pathologic nonfunctional mesohypopharyngeal entities.

## References

1. Rubesin SE. Pharynx. In: Laufer I, Levine MS, eds. *Double contrast gastrointestinal radiology*. Philadelphia: WB Saunders, 1992:82–87
2. Bachman AL, Seaman WB, Macken KL. Lateral pharyngeal diverticula. *Radiology* 1968;91:774–782
3. Lindbichler F, Raith J, Gröll R, et al. Topographic evaluation of lateral hypopharyngeal pouches using electron beam tomography. *Abdom Imaging* 1998;23:35–37
4. Ardran GM, Kemp FH. Impaired motility in the pharynx and oesophagus. *Gut* 1962;3:94–96
5. Brühlmann WF. Laterale Divertikel des Pharynx und des pharyngoösophagealen Überganges. In: Brühlmann WF, ed. *Die röntgenkinematographische Untersuchung von Störungen des Schluckaktes*. Bern: Hans Huber, 1985:153–160
6. Ettman IK, Ramey DR. Lateral pharyngeal diverticulum: unusual cause of dysphagia and hoarseness. *Am J Gastroenterol* 1967;47:490–497
7. Hannig C, Wuttge-Hannig A, Bockmeyer M. Nachweis einer höheren Inzidenz pathologischer somatischer Befunde beim Globusgefühl durch Einsatz der Hochfrequenzkinematographie. *HNO* 1987;35:296–301
8. Herrmann IF. Entzündungen und sonstige Erkrankungen im Rachen. In: Naumann HH, Helms J, Herberhold C, et al, eds. *Oto-Rhino-Laryngologie in Klinik und Praxis*, vol 2. Stuttgart: Thieme, 1992:614–616
9. Lindbichler F, Raith J, Uggowitzer M, et al. Aspiration resulting from lateral hypopharyngeal pouches. *AJR* 1998;170:129–132
10. McMyn JK. Lateral pharyngeal diverticula. *J Fascial Radiol* 1957;8:421–425
11. Ward PH, Fredrickson JM, Strandjord NM, et al. Laryngeal and pharyngeal pouches. *Laryngoscope* 1963;73:564–582
12. Schwartz EE, Tucker JA, Holt GP. Cervical dysphagia: pharyngeal protrusions and achalasia. *Clin Radiol* 1981;32:643–650
13. Rubesin SE, Jessurun J, Robertson D, et al. Lines of the pharynx. *Radiographics* 1987;7:217–237
14. Ekberg O, Nylander G. Lateral diverticula from the pharyngo-oesophageal junction area. *Radiology* 1983;146:117–122
15. Ramsey GH, Watson JS, Gramiak R, et al. Cinefluorographic analysis of the mechanism of swallowing. *Radiology* 1955;64:498–518
16. Ungerecht K. Ösophagus. In: Berendes J, Link R, Zöllner F, eds. *Hals-Nasen-Ohren-Heilkunde in Klinik und Praxis*, vol 3. Stuttgart: Thieme, 1978:15–16
17. Rubesin SE. The pharynx. In: Ott DJ, Gelfand DW, eds. *Radiology of the upper gastrointestinal tract*. Radiologic Clinics of North America, vol 32. Philadelphia: WB Saunders, 1994:1086–1092
18. Jones B, Kramer SS, Donner MW. Dynamic imaging of the pharynx. *Gastrointest Radiol* 1985;10:213–224
19. Jones B, Donner MW. Examination of the patient with dysphagia. *Radiology* 1988;167:319–326
20. Hannig C. Methodik; Neurologische Schluckstörungen. In: Hannig C, ed. *Radiologische Funktionsdiagnostik des Pharynx und des Ösophagus*, vol 38. Berlin: Springer-Verlag, 1995:120–124