

Adrian F. Fernando, MD¹
 Jose Florencio F. Lapeña, Jr., MA, MD^{2,3}
 Gil M. Maglalang, Jr., MD^{4,5}

¹Department of Otorhinolaryngology
 Head and Neck Surgery
 University of the East – Ramon Magsaysay
 Memorial Medical Center, Inc.
 Quezon City, Philippines

²Department of Otorhinolaryngology
 College of Medicine – Philippine General Hospital
 University of the Philippines Manila

³Department of Otorhinolaryngology
 Head and Neck Surgery
 East Avenue Medical Center
 Diliman, Quezon City, Philippines

⁴Department of Radiology
 University of the East – Ramon Magsaysay
 Memorial Medical Center, Inc.
 Quezon City, Philippines

⁵Institute of Radiology
 St. Luke's Medical Center
 Quezon City, Philippines

Correspondence: Adrian F. Fernando, MD
 Department of Otorhinolaryngology – Head & Neck Surgery
 Rm. 463, Hospital Service Bldg., UERMMMC, Inc.,
 64 Aurora Blvd., Quezon City 1113
 Philippines
 Phone: (632) 7150861 local 257
 Telefax: (632) 7161789
 E-mail: ianfernando_md@yahoo.com
 Reprints will not be available from the authors.

The authors declared that this represents original material that is not being considered for publication or has not been published or accepted for publication elsewhere, in full or in part, in print or electronic media; that the manuscript has been read and approved by all the authors, that the requirements for authorship have been met by each author, and that each author believes that the manuscript represents honest work. Dr. Maglalang developed the original concept and provided the radiographs; Drs. Lapeña and Fernando did the research and developed the manuscript. All three authors revised the manuscript for content and approved the final version.

Disclosures: The authors signed disclosures that there are no financial or other (including personal) relationships, intellectual passion, political or religious beliefs, and institutional affiliations that might lead to a conflict of interest.

The Black Sombrero: A Helpful Landmark in Axial Imaging Evaluation of the Larynx and Hypopharynx

Computed Tomography (CT) scan and Magnetic Resonance Imaging (MRI) evaluation of the larynx and hypopharynx can be tricky for the untrained eye. We discuss a peculiar pattern of the supraglottic airway at the level of the base of the epiglottis seen on axial CT and MR images, resembling a “black hat” or a “black sombrero.” The level of the base of the epiglottis also corresponds to that of the hyoid bone, where two valuable hypopharyngeal sub-sites are visible—the pyriform sinuses and the posterior hypopharyngeal wall.

A hat has basically two parts, an apical convex crown and a basal horizontal brim. (Figure 1.A) Correlating the hat’s appearance on axial CT and MR imaging, the hat appears black due to the presence of air at the supraglottic level wherein the crown is positioned anteriorly and the brim positioned posteriorly. (Figure 1.B)

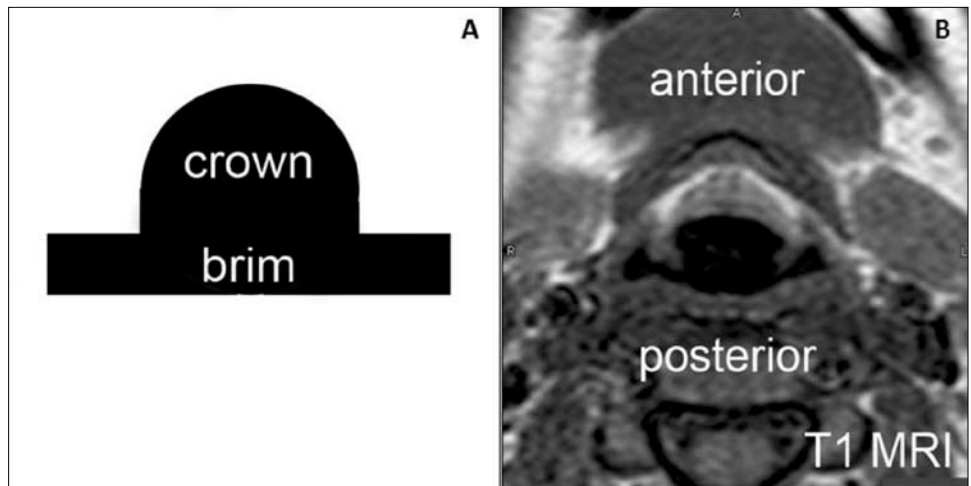
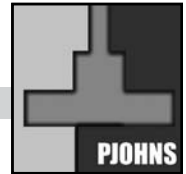


Figure 1. The “Black Sombrero” on axial MR imaging of the supraglottis

1.A. The black hat illustrated with an apical convex crown and a horizontal basal brim.

1.B. Axial MRI correlation of the black hat at the level of the supraglottis. Note that the crown or the epiglottis is located anteriorly while the brim abuts the posterior hypopharyngeal wall.



The top-most convex part of the **crow** corresponds to the base of the epiglottis. Anterior to it is the pre-epiglottic fat plane and the body of the hyoid bone. The crown is also flanked by the paraglottic fat plane on both sides that appears hypodense (dark) on CT and hyperintense (bright) on T1 MRI. On the other hand, the posterior-most portion of the hat's **brim** abuts the posterior hypopharyngeal wall - laterally outlining the pyriform sinuses on each side. The area where the crown joins the brim corresponds to the aryepiglottic folds that are delineated laterally by the medial walls of the pyriform sinuses while its medial aspects correspond to portions of the supraglottis. (Figure 2)

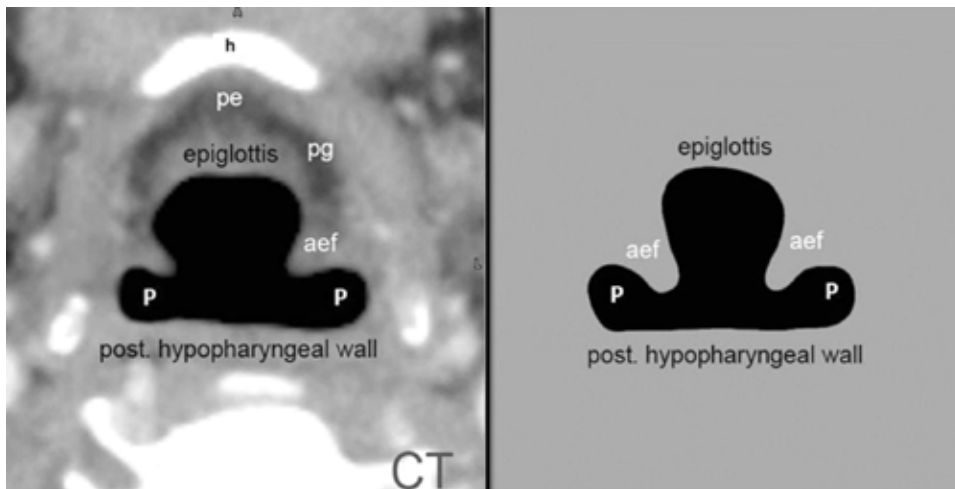


Figure 2. aef, aryepiglottic fold; h, hyoid bone; pe, pre-epiglottic space; pg, paraglottic space; P, pyriform sinuses

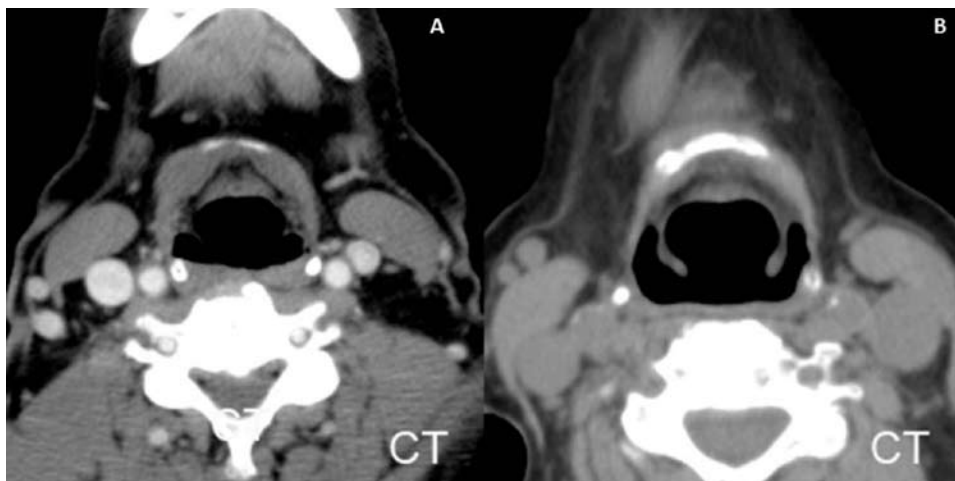


Figure 3. Variations in the size and configuration of the hat
 3.A With a big crown and a small brim, resembling a "bowler" or "derby hat"
 3.B With a tall crown and a floppy brim, resembling a "Mexican sombrero"

The size and configuration of the hat varies and can range from one with a big crown and a small brim (resembling a “bowler” or “derby hat”) to one with a tall crown and a floppy brim (resembling a “Mexican sombrero”). (Figures 2, 3) Infiltrating tumors and inflammatory processes can distort the hat’s usual symmetric configuration which can be useful in determining possible sites of inflammation or infection, tumor origin and spread to hypopharyngeal and supraglottic structures, as the hat’s center represents a potential space at the supraglottic area devoid of any soft tissue structures. (Figure 4)

In radiology, “the bowler hat sign” and “Mexican hat sign” have been used to describe gastrointestinal polyps.^{1,2,3} The former “is produced by the acute angle of attachment of the polyp to the mucosa” while the latter “consists of two concentric rings and is produced by visualizing a pedunculated polyp head-on.”¹ The “Mexican hat sign” has also been used to describe osmotic demyelination on MRI.⁴

To our knowledge, these terms have not been applied to the interpretation of supraglottic and hypopharyngeal CT and MRI axial images. Recognition of the “Black Sombrero” pattern can be helpful in understanding the anatomic relationship of the supraglottic and hypopharynx structures on axial CT and MR imaging particularly in the evaluation of supraglottic and hypopharyngeal tumor spread.

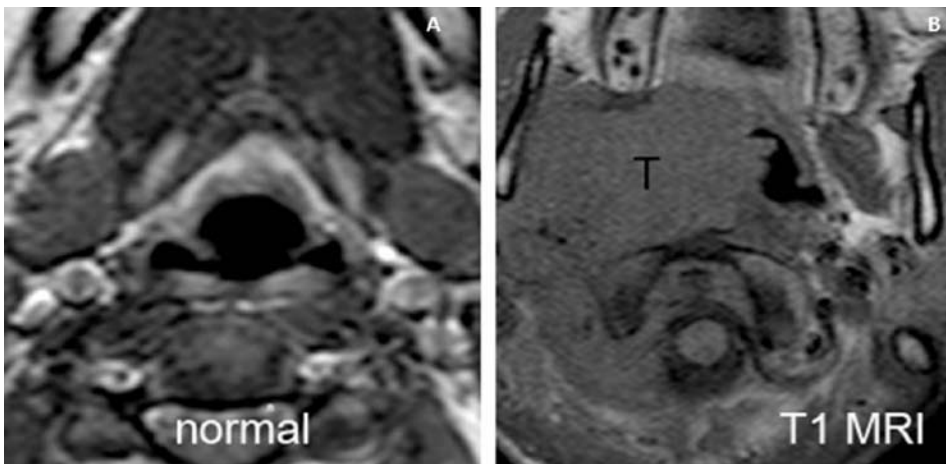


Figure 4. Axial T1 MR Images of the supraglottis

4.A. Normal supraglottis and hypopharyngeal imaging

4.B. Imaging of the supraglottis shows a large mass infiltrating both the right supraglottic and almost the entire hypopharyngeal spaces; T, tumor

REFERENCES

1. Brant WE. Gastrointestinal tract. In: Brant WE, Helms CA, editors. *Fundamentals of Diagnostic Radiology* 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins 2007. p 822.
2. Levine MS, Rubesin SE, Laufer I, Herlinger H. Diagnosis of colorectal neoplasms at double-contrast barium enema examination. *Radiology* 2000 Jul; 216(1):11-18. [cited 2010 Nov 11] Available from <http://radiology.rsna.org/content/216/1/11.full.pdf>.
3. Keller CE, Halpert RD, Feczko PJ, Simms SM. Radiologic recognition of colonic diverticula simulating polyps. *AJR* 1984 Jul; 143(1):93-97.
4. Islam O, Dillon G. MRI in osmotic demyelination: the “Mexican hat” sign. *The internet journal of radiology* [serial on the Internet] 2010 [cited 2010 Nov 11]; 12(1):[about 3 p.] Available from: http://www.ispub.com/journal/the_internet_journal_of_radiology/volume_12_number_1_6/article/mri-in-osmotic-demyelination-the-mexican-hat-sign.html.