Jet engines help solve the mysteries of the voice

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Although scientists know about basic voice production—the two "vocal folds" in the larynx vibrate and pulsate airflow from the lungs—the larynx is one of the body's least understood organs.

Sound produced by vocal-fold vibration has been extensively researched, but the specifics of how airflow actually affects sound have not been shown using an animal model—until now.

Vortices, or areas of rotational motion that look like smoke rings, produce sound in jet engines. New research from the University of Cincinnati uses methods developed from the study of jet noise to identify similar vortices in an animal model.

Sid Khosla, MD, lead author of the study, says vortices may help explain why individual voices are different and can have a different richness and quality to their sound.

"If vortices didn't affect sound production, the voice would sound mechanical," says Khosla, assistant professor of otolaryngology. "The vortices can produce sound by a number of mechanisms. This complexity produces a sound that makes my voice different from yours."

Khosla and his team report their findings in the March edition of the *Annals of Otology, Rhinology and Laryngology*.

"Understanding how airflow patterns affect sound in a jet engine

(aeroacoustics) helps us determine how we can reduce jet noise," says coauthor Ephraim Gutmark, PhD, a UC professor of aerospace engineering. "We can apply the same physical understanding of aeroacoustics to study normal and abnormal voice."

According to Khosla, computational and theoretical models have been developed to demonstrate how vortices affect sound production, but the UC team is the first to demonstrate it using an animal model, which makes their findings more applicable to the human larynx.

"Currently, when surgery is required to treat voice disorders, it's primarily done on the vocal cords," says Khosla. "Actually knowing there are additional sources that affect sound may open up a whole new way for us to treat voice disorders."

In addition to better surgery techniques, Khosla says, having a better understanding of how vortices affect voice production could help in the development of improved pharmacological approaches and clinical pathology services, as well as improved training of the voice.

Source: University of Cincinnati