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A shortwave infrared sinuscope for cerebrospinal fluid leaks detection

Stanford researchers have developed a novel shortwave infrared (SWIR) sinuscope to noninvasively detect cerebrospinal fluid (CSF) leaks during skull base surgeries. Detecting CSF leaks during the procedure can be challenging for physicians due to the interference of blood in the surgical field. Delayed diagnosis of CSF leaks can lead to life-threatening complications, such as meningitis.

The current method of diagnosing CSF leaks commonly involves intrathecal fluorescein, delivered via a lumbar puncture. Once administered, the dye circulates to the cranial cavity, allowing clinicians to visualize potential leaks under specialized lighting. This approach is invasive with the risk of severe complications including infection, seizures, and even death. Other methods, such as laboratory analysis of nasal fluid for Beta-2 transferrin, can be time-consuming, require sufficient fluid samples, or lack the immediacy needed for intraoperative decision-making.

This innovative tool leverages the water absorption profile in the SWIR band, enabling the identification of CSF without the need for intrathecal contrast agents. By coupling with the current standard non-invasive endoscope with special lighting targeting the natural absorption peak of CSF, this device can help clinicians visualize leaks in real time without the risk of invasive procedure and administration of contrasting agents.

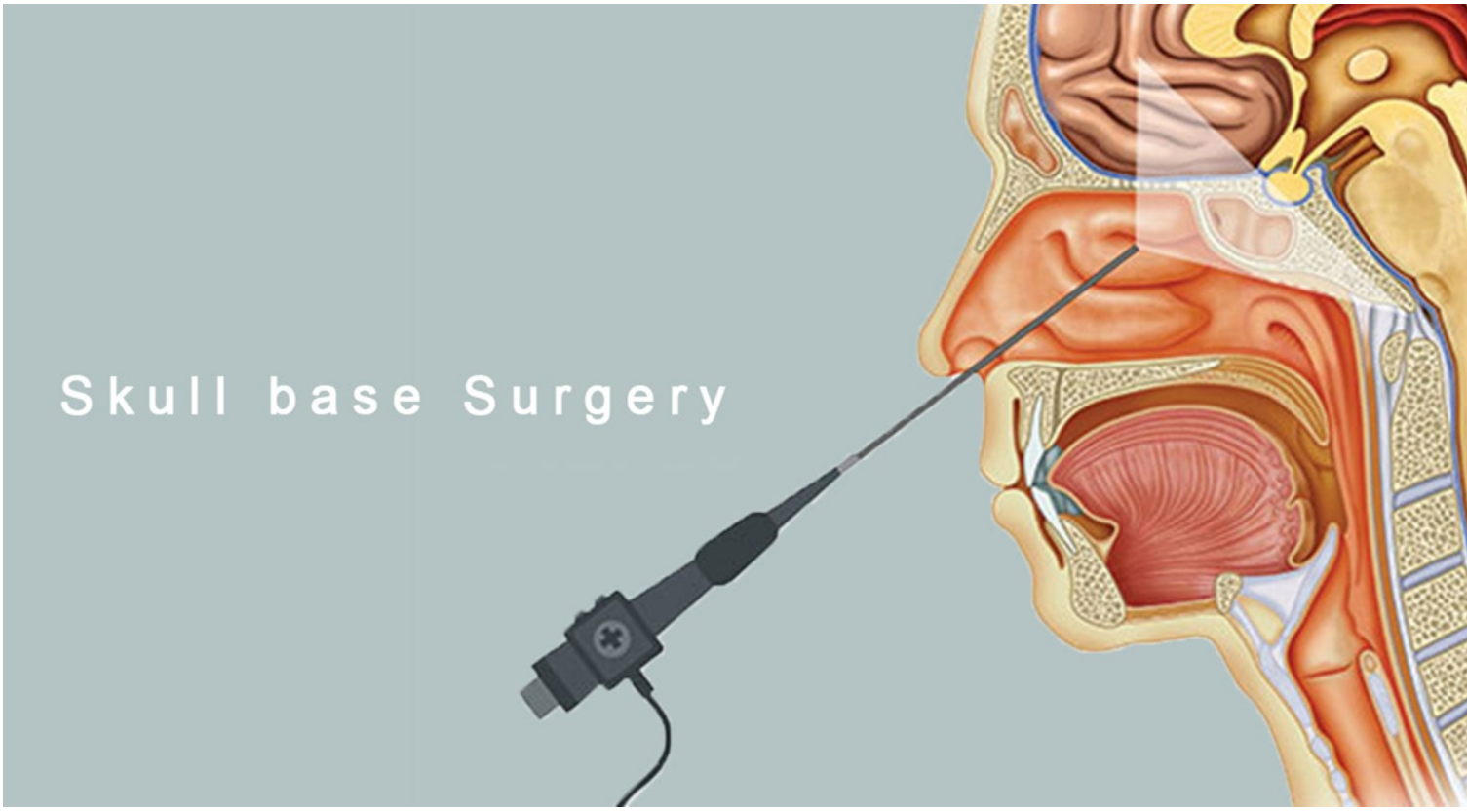

Image credit:Inventors

Applications

- Real-time Intraoperative CSF Leak Detection
- Improved Postoperative Monitoring
- Potential Applications Beyond the Sinus Cavity

Advantages

- Noninvasive detection
- Integration with Existing Equipment
- Real-time diagnosis

Patents

- Published Application: WO2024086249
- Published Application: 20250247597

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