

An Innovative Approach for Rapidly and Non-Invasively Detecting Anastomotic Leakage Author: Prajna Wijaya



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Anastomotic Leakage

- Resection: surgical removal of a part of an organ, tissue, or structure within the body.
- commonly performed to eliminate or reduce the extent of the affected or diseased area, thereby alleviating symptoms, preventing further complications, and improving the patient's overall health and quality of life.
- By removing the problematic portion, surgeons aim to eliminate the source of the disease or condition, such as tumors, blockages, or damaged tissues.

tumor

resection

Anastomotic Leakage

- It can give rise to various serious complications, including infection, sepsis, wound breakdown, prolonged hospitalization, impaired organ function, and even mortality.
- Happens in up to ONE in TEN resections
- ONE in FIVE cases results in death

anastomosis

Why is this important?

- Given the significant risks and potential mortality associated with anastomotic leakage, early detection becomes critically important.
- Early detection of anastomotic leakage plays a crucial role in preventing complications and improving patient outcomes.
- allows healthcare providers to closely monitor patients, initiate targeted interventions, and provide appropriate supportive care.



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Current Methods

- Detecting anastomotic leakage poses challenges for healthcare providers due to several factors. (nonspecific symptoms, such as fever, abdominal pain, distension, changes in bowel movements, or wound-related issues)
- Many current detection methods, such as endoscopy or contrast studies, require invasive procedures. (discomfort, risk of infection, and specialized training for healthcare professionals)
- Conventional laboratory test can be lengthy, delaying the diagnosis and subsequent intervention.

Endoscope

Invention

- To address the urgent need for rapid and non-invasive detection of anastomotic leakage, the innovative technique was proposed.
- Studies have demonstrated that the level of urinary neopterin can function as an informative marker for assessing the risk and early identification of anastomotic leakage (cell-mediated immunity)

Dipstick

- Nitrocellulose strips were coated with polyclonal sheep antineopterin serum at dilutions of 1/40.
- Sera, neopterin standards, and control sera, each comprising 50 pl, were combined with neopterin-alkaline phosphatase conjugate (150 pl). Mixture was incubated with the dipsticks in a dark environment at ambient temperature for a duration of 2 hours.
- Following the incubation, the dipsticks were subjected to washing using running tap water and then exposed to the precipitating substrate Fast Blue BB at ambient temperature for 10 minutes.
- dipsticks were rinsed with tap water and any excess liquid was removed using a paper towel. Finally, the dipsticks were air-dried at ambient temperature.



Testing and Validation

- urine samples are collected from patients suspected of having anastomotic leakage. The samples are retrieved from a clinical pathology laboratory in a hospital, following all necessary ethical clearance protocols.
- isolate neopterin from the collected urine samples, established isolation protocols are employed.
- diluted in concentration of 20 nmol/l, 40 nmol/l, 60 nmol/l, 80 nmol/l, and 100 nmol/l.



Testing and Validation

- Samples undergo the enzyme-linked immunosorbent assay (ELISA) method. ELISA kits specific to neopterin detection, known for their accuracy and reliability, are utilized for this purpose.
- After the quantitative measurements with ELISA, a neopterin dipstick is developed for practical application. The dipstick allows for quick and visual detection of neopterin levels in urine samples, facilitating the identification of anastomotic leakage.



Control

 potential interference from other urine components, a control urine sample is collected from a healthy individual. Both the ELISA method and the neopterin dipstick are applied to the control urine sample, ensuring consistency and reliability in the testing process.

Composition of Urine and its Significance



Results

 Reading guides are established to predict the occurrence of anastomotic leakage based on neopterin levels. These guides help identify dangerously high neopterin levels, serving as an early indicator of potential anastomotic leakage. The guides aid healthcare professionals in making informed decisions regarding patient management.

Novelty and strengths

The conducted testing has yielded evidence of:

- an innovative approach that is characterized by accuracy and reliability.
- offers user-friendliness, eliminating the need for specialized training among healthcare workers.
- includes a comprehensive reference guide that facilitates the interpretation of results, particularly in the identification of anastomotic leakage.
- Cost-effective, accurate (comparable to ELISA), and non-invasive.

Novelty and strengths utilized either independently with a urine sample, using the reading guide as a point of reference, or alternatively, an additional innovation has been developed wherein the dipstick is directly incorporated into a urine bag.





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THANK YOU sources and further read: bit.ly/ennovate-AL



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