AMSj
Amsterdam Medical Student journal

NEWS | REGROWTH IN ALOPECIA

CHANGING PERSPECTIVES | VIRTUAL AND AUGMENTED REALITY IN STROKE REHAB: *REVOLUTION FOR ALL PATIENTS OR JUST THE PRIVILEGED?*

Jubilee Edition

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AMSj

The Amsterdam Medical Student journal (AMSj) is a scientific journal created and published by Amsterdam UMC staff members and students to promote research and to encourage other medical students to publish their clinical observations, research articles and case reports. Go to www.amsj.nl for publication options and to find out how you can contribute to AMSj as reviewer or member of the editorial board.

Editorial

Dear readers,

The word Jubilee comes from the Hebrew word "יובל" (*yōḇēl*) in the Old Testament, meaning "ram's horn". The "יובל" is a holy year, and takes place following seven cycles of sabbatical years. It begins with blowing the ram's horn, signaling the Land of Israel to give back to God by liberating the captives, forgiving debt, and returning properties to the owner. This symbolizes the liberty, freedom, and justice from God. Today, the word is more commonly used to celebrate an anniversary. With this *Jubilee Edition of AMSj*, we proudly celebrate the 10th anniversary of our journal!

This issue is filled with exciting and diverse articles. In our Changing Perspectives section, discover the potential of phage therapy as a targeted alternative to antibiotics, and explore how virtual and augmented reality can transform stroke rehabilitation. Then flip to pages 13 and 14 to test your knowledge with clinical images cases on knee trauma and cardiology, respectively.

Roos Frölke wrote an insightful article on the difference between diagnostic and prognostic research on page 9. Of course, we continue to challenge you with our radiology quiz on page 7. Don't forget to check out the latest updates in the medical research world, varying from the role of sex hormones in female atherosclerosis to fluorescence visualization-guided surgery in oral malignancies.

We also feature practical and surgical insights: learn the anatomy of Poupart's ligament and the difference between direct and indirect hernias in a must-read piece by Van Schie and Van Emden, as hernia repair is done in 25.000 patients in the Netherlands each year. Are robot-assisted minimally invasive procedures better than a maximally invasive sternotomy in the field of cardiac surgery? Bhoera et al. presented their experience of robotic mitral valve results in the first 100 patients. Read more on page 15. Curious what to prescribe for persistent hiccups with nausea? Find out in the Case Report by O'Herne et al.

AMSj will celebrate the anniversary on the 4th of July, at the Nicolaes Tulp Symposium in Agnietenkapel. Don't forget: submit your research before September 14th for a chance to win a €1000 prize!

Finally, we warmly welcome all new students starting their medical journey this year. As editor-in-chiefs, we wish you an inspiring start to the academic year. Reach out to us anytime for advice on medical research or our journal (chief-editor.amc@amsj.nl). If you are eager to explore a specialty early, do not hesitate to join our team! Refer to our website for vacancies!

With gratitude to all authors for their contributions, without whom this special edition would not have been possible.

Best regards,
Bobby Lam and Tina Vekua
Student Editor-in-Chief
Amsterdam UMC,
location AMC and VUmc

SURGERY

WHAT'S NEW

Fluorescence visualization-guided surgery in the removal of oral squamous cell carcinoma.

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Traditionally a margin of 10-15 mm is accepted in the surgical resection of a cancerous lesion. The aim of implementing this margin is to be more confident in the removal of cancerous/dysplastic cells, which can even be located at a distance from the clinically visible cancerous border. Implementing a fluorescence visualization-guided surgery (FVS) approach enables visualization of a larger area of both cancerous as well as (premalign) dysplastic tissue. Surrounding the clinical tumor will be a darker area, called fluorescence visualization loss (FVL), due to increased angiogenesis, reduction of coenzymes and destruction of collagen cross-links. FVS would in turn result in a more precise resection and thus a lower recurrence rate.

A recent retrospective cohort study[1] aimed to compare the local control (LC) between FVS and conventional surgery for patients with stage I and II in mandibular squamous cell carcinoma (MSCC). Medical records dated from 2000-2021 were analysed in which patients with complete medical records and aged at least 18 years of age were included. The outcome variable was 5-year LC defined as no recurrence within 20 mm of the resection site. There were 36 and 20 patients in, the conventional and FVS group respectively.

Five-year LC with FVS shows to be significantly higher than conventional surgery (p = 0,04; 94,4% vs 77,2%). There were no differences in characteristics and quality of life. These findings suggest an added benefit of FVS in early staged MSCC.

1. Morikawa, T., Shibahara, T., & Takano, M. (2024). Fluorescence Visualization-guided surgery improves Local control for Mandibular Squamous Cell Carcinoma. Journal of Oral and Maxillofacial Surgery.

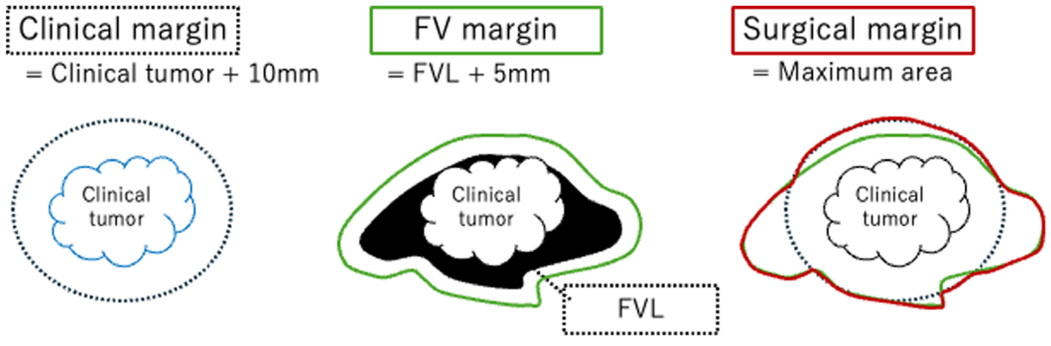

FIGURE 7 Conceptual Diagram. A Conceptual Diagram is Shown. Clinical Margin is then Set at 10 mm From the Clinical Tumor Area (Black dotted line). FV Margin is then Set at 5 mm from FVL (Green line). Surgical Margin is set as the Maximum Area Delineated Using these Clinical and FV Margins (Red line). FVL, Fluorescence Visualization Loss[1]

ENDOCRINOLOGY

Orforglipron: Oral GLP-1 Agonist in Type 2 Diabetes Treatment

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The ACHIEVE-1 Phase 3 trial assessed the efficacy and safety of orforglipron—a once-daily, oral non-peptide GLP-1 receptor agonist—in adults with early-stage type 2 diabetes managed by lifestyle alone. In this 40-week, randomized, double-blind, placebo-controlled study, 559 participants were randomized to receive orforglipron (3 mg, 12 mg, or 36 mg) or placebo. The primary endpoint was the change in HbA1c from baseline to week 40.

Results showed significant, dose-dependent HbA1c reductions in all orforglipron groups compared to placebo (3mg = –1.24% , 6mg = -1,47%, 12mg = -1.48% vs placebo –0.41%; p <0.001 for all comparisons). The mean HbA1c at week 40 in the active treatment groups was 6,5% to 6,7% and glycemic targets (HbA1c < 7%) were reached in 68% of the participants. Weight reduction was substantial, with up to 7.9% loss in the 36 mg group versus 1.6% with placebo. Secondary measures such as fasting glucose, lipids, and systolic blood pressure also improved. Gastrointestinal side effects (nausea, diarrhea, dyspepsia) were common, primarily during dose escalation; discontinuation rates due to adverse events were modest. No severe hypoglycemia or liver toxicity emerged.

These findings indicate that orforglipron could provide a convenient and effective oral alternative to injectable GLP-1 therapies, resulting in clinically meaningful improvements in HbA1c and weight loss without food restrictions. Further trials are ongoing to explore long-term outcomes and comparative efficacy.

1. Rosenstock J, Hsia S, Nevarez Ruiz L, et al. Orforglipron, an oral small-molecule GLP-1 receptor agonist in early type 2 diabetes. N Engl J Med. 2025;392(25):1234-1245.

Sex hormones show opposite effects in atherosclerosis protection between early and late postmenopausal women

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Women generally have a lower cardiovascular risk due to the presumed protective effects of female sex hormones. During menopause estradiol production ceases, leading to reduced cardiovascular protection while inducing climacteric symptoms like hot flashes and fatigue. Hormonal therapy (HT) with estradiol is commonly prescribed to manage these symptoms, and is thought to potentially reduce cardiovascular risk. However, past studies report conflicting results, and it remains unclear whether timing of HT influences its cardiovascular effects.

Chen et al. conducted a double-blind randomized controlled trial in the United States of America, where 535 women received oral 17-beta-estradiol or placebo for 3 years: 227 (42.4%) were early (<6 years since menopause) and 308 (57,6%) late postmenopausal (≥10 years since menopause). The median follow-up was 3.0 years, and serum Sex Hormone-Binding Globulin (SHBG), estrone and estradiol were quantified at baseline, 12 and 36 months using radio-immunoassays. Carotid Intima-Media Thickness (CIMT) was measured every 6 months by ultrasound. Here, SHBG-levels correlated inversely with CIMT progression in early menopausal women (each 1 SD increase in SHBG was associated with -1.80 (95%CI -3.36;-0.25) µm CIMT/year, p=0.024), but positively in the late postmenopausal group (1.25 (95%CI 0.07;2.43) µm CIMT/year per 1 SD increase SHBG, p=0.037), adjusted for age. Similarly, estrone and estradiol levels positively correlated with CIMT progression in late postmenopausal women, while early postmenopausal women showed an inverse (but statistically insignificant) association.[1] (1)

These findings highlight that the timing of menopause influences how sex hormones affect cardiovascular risk. This suggests that clinicians should consider the menopausal stage when prescribing hormonal therapy.

1. Chen I.J., Stanczyk F.Z., Sriprasert I. et al. 2025. Sex steroid hormones and subclinical atherosclerosis progression in postmenopausal women. European Journal of Endocrinology. 192(3):248–56.

News: Regrowth in Alopecia

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Alopecia areata is an autoimmune disorder that causes patchy, non-scarring hair loss. It affects approximately 2% of the Dutch population, often manifesting before the age of 30.[1] While spontaneous remission can occur and treatments such as Kenacort injections, ciclosporine, and methotrexate are currently used, treatment responses can vary. Some patients experience persistent symptoms, which may lead to significant psychosocial impact, particularly in young adults.

A recent study published in the Journal of the European Academy of Dermatology and Venereology (2025)[2] compared two oral Janus kinase (JAK) inhibitors, **ritlecitinib 50 mg and baricitinib 4 mg**, in patients with moderate-to-severe alopecia areata. Both treatments showed strong efficacy, with significant hair regrowth measured by the Severity of Alopecia Tool (SALT) score, which quantifies hair loss by assessing the percentage of scalp area affected. Ritlecitinib appeared to produce faster clinical responses, as evidenced by a more rapid reduction in SALT scores over the treatment period, while baricitinib is already approved and reimbursed in the Netherlands.

JAK inhibitors work by blocking key inflammatory pathways involved in autoimmune processes. Originally developed for rheumatologic diseases, these agents are now entering dermatology with increasing success.

This study marks a meaningful advancement in the management of alopecia areata, offering patients new, effective systemic treatments after decades of limited options. It also underscores a broader shift in dermatology toward personalized, immune-targeted therapies.

For medical students, it highlights how understanding immunological mechanisms can translate into real clinical impact, even in conditions considered treatment-resistant.

1. Dikrama, P., & Smit, C. (2025). Richtlijn Alopecia areata 2024 (samenvatting). Nederlands Tijdschrift Voor Dermatologie en Venereologie, 35(1).
2. Saceda-Corralo, D., & Vañó-Galván, S. (2025). Strong efficacy of ritlecitinib 50 mg and baricitinib 4 mg in alopecia areata, but further research needed to establish superiority. Journal Of The European Academy Of Dermatology And Venereology, 39(6), 1072–1073.

Liberal fluid intake versus fluid restriction in chronic heart failure patients

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Heart failure (HF) patients are often advised to restrict fluid intake to prevent congestion. However, evidence supporting this recommendation remains limited and inconsistent. Therefore, the recently published Fluid REStriction in heart failure versus liberal fluid UPtake (FRESH-UP) trial, conducted in the Netherlands, examined the effects of liberal versus restrictive fluid intake in HF patients. [1]

This randomized, open-label trial assigned 504 chronic stable HF patients (NYHA II-III) to liberal or restricted (1500 mL/day) fluid intake for three months to assess differences in patient-reported health status. Stable heart failure was defined as the absence of HF hospitalization three months before randomization and no changes in HF medication two weeks prior to randomization. After three months, self-reported health status did not differ significantly between the groups. However, thirst distress was significantly lower in the liberal group. Importantly, liberal fluid intake did not come at a cost regarding safety (no difference in mortality, hospitalizations, use of oral or intravenous loop diuretics, or kidney injury). Moreover, NT-proBNP levels, weight and HF medication adjustments remained comparable during six months of follow-up.

In conclusion, the FRESH-UP trial demonstrated no significant health status benefit from liberal fluid intake, but it did reduce thirst. Importantly, this did not come at a cost for patient safety. These findings question the ingrained advice to restrict fluid intake for HF patients. However, the trial had several limitations including the use of the Thirst Distress Scale requiring further validation, a short follow-up period, and limited generalizability due to a predominantly white, male, European study population. Therefore, future studies should evaluate fluid intake in more diverse, unstable HF populations with longer follow-up and validated thirst scales.

1. Herrmann JJ, Brunner-La Rocca H, Baltussen LEHJM, et al. Liberal fluid intake versus fluid restriction in chronic heart failure: a randomized clinical trial. Nat Med. 2025Jun;31(6):2062-2068

PAC-MANN: A Rapid, High-Throughput Magnetic Nanosensor for Early Pancreatic Cancer Detection

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Pancreatic ductal adenocarcinoma (PDAC) remains one of the most lethal cancers, largely due to its typically late-stage diagnosis. A recent study introduced a novel, noninvasive liquid biopsy assay that capitalizes on the increased serum protease activity in PDAC patients.[1] Researchers screened a variety of protease-cleavable peptide probes and identified a matrix metalloproteinase-sensitive (MMP) probe that could differentiate PDAC from both healthy controls and noncancerous pancreatic conditions with 79 ± 6% accuracy.[1] This probe was subsequently integrated into a rapid magnetic nanosensor assay, termed PAC-MANN, which produces a straightforward fluorescent readout upon protease cleavage.

In a blinded retrospective study, the PAC-MANN assay demonstrated an impressive 98% specificity and 73% sensitivity across all stages of PDAC. Furthermore, when used in combination with the clinical biomarker CA 19-9, the assay achieved 85% sensitivity for detecting stage I PDAC at 96% specificity. Notably, a decrease in probe cleavage signal following surgical tumor removal suggests that the assay could also be a valuable tool for monitoring treatment response over time.

The PAC-MANN assay offers a high-throughput, rapid, and minimally invasive approach that uses small volumes of blood. This innovative technique not only holds promise for enhancing early detection of PDAC but also for improving post-treatment surveillance, potentially leading to more timely interventions and better overall patient outcomes.[1]

1. Montoya Mira JL, Quentel A, Patel RK, Keith D, Sousa M, Minnier J, et al. Early detection of pancreatic cancer by a high-throughput protease-activated nanosensor assay. Sci Transl Med. 2025 Feb;17:eadq3110.

Diagnosing Midfoot Pain After Trauma

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CASE

A 30-year-old woman presents to the emergency department one day after tripping over a doorstep. She reports hearing a cracking sound at the time of trauma and is now unable to bear weight on her left foot. On examination, there is swelling and hematoma on the dorsum of the foot, axial tenderness of the 3rd and 4th toes, and pressure pain over metatarsophalangeal (MTP) joints 1 to 4. An X-ray and CT-scan were made.

FIGURE 1 X-foot left

FIGURE 2 CT foot left MT2

FIGURE 3 Weight-bearing X-foot left-right comparison

QUESTION 1
Describe the two fractures seen on the initial imaging, depicted in Figures 1 and 2.

QUESTION 2
What additional imaging is recommended given this clinical presentation?

QUESTION 3
What is the most likely diagnosis based on the clinical presentation and the weight bearing x-ray?

A. Chopard joint dislocation
B. Lisfranc injury
C. Navicular stress fracture
D. Midfoot contusion

QUESTION 4
What are the potential consequences of missing this diagnosis?

A. Delayed bone healing
B. Minimal functional impairment
C. Risk of nerve entrapment
D. Development of midfoot instability,

Answer on page 31

Persistent hiccups

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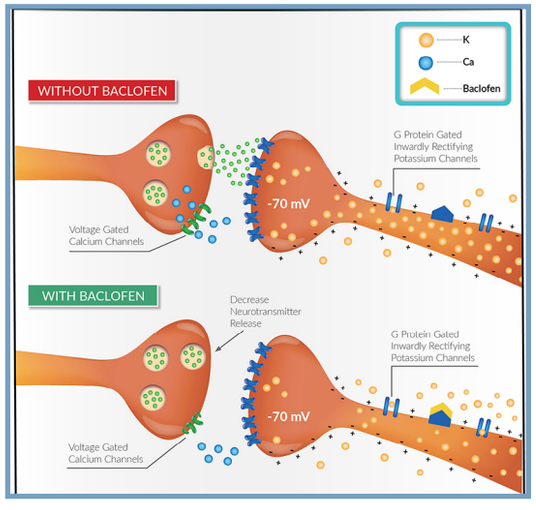
CASE

A 74-YEAR-OLD MAN is referred by his general practitioner to the emergency department with persistent hiccups. The hiccups have been present for 10 days without interruption, occurring several times per minute and also at night. They started directly after a short episode of vomiting due to gastroenteritis. The gastrointestinal symptoms had already resolved at the time of presentation. According to the history, there are no additional complaints or identifiable causes for the hiccups. His medical history includes a single kidney with ureteric stent, renal insufficiency, and type 2 diabetes. The patient uses acetylsalicylic acid, pantoprazole, telmisartan, simvastatin, dapagliflozin, metformin, and semaglutide, without any recent changes in medication. Physical examination reveals no abnormalities apart from the frequent hiccups. Additional blood tests show a mild post-infectious profile. A chest X-ray shows a normal position of the diaphragm and a normal heart and lung appearance.

There is a wide range of pathophysiological mechanisms for hiccups. The most common cause is gastric distension due to eating too quickly, spicy food, alcohol, carbonated drinks, or aerophagia. In addition, many pathological or iatrogenic mechanisms have been described, though none seem applicable in this case.[1,2]

A randomized controlled trial reports significant efficacy of baclofen and metoclopramide in treating hiccups. No studies have directly compared baclofen and metoclopramide with each other.[1] Baclofen performs better than placebo, and prospective studies show that baclofen monotherapy is effective for patients with idiopathic, oncogenic, or neurogenic hiccups. Both drugs have the advantage of being safe and easy to administer.[1-5]

Given its applicability, baclofen was selected as treatment for our patient due to its central muscle relaxant effect, low side-effect profile, and lack of interactions with the patient's prescribed medication. After the first administration of 7.5 mg baclofen, the patient experienced relief from his symptoms. However, after 90 minutes, another 5 mg was administered due to recurrence of the hiccups. Thereafter, the patient remained asymptomatic, but due to general weakness and fatigue, he was admitted for overnight observation and discharged the following morning.



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Understanding the Differences Between Diagnostic and Prognostic Research

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INTRODUCTION

In medicine, we are constantly trying to predict things. Does this patient have the disease we suspect? What are their chances of developing complications? How long might they live with their current condition? These questions all require some form of prediction; but they are not all the same. That's where diagnostic and prognostic research come in. While both involve clinical prediction models, they serve very different purposes. One helps determine what is going on right now while the other looks to the future.

Understanding the difference between diagnostic and prognostic research is not simply for academic textbooks, it is essential for making solid clinical decisions.

In this review, we will explore differences between diagnostic and prognostic research, why it matters, and how recent studies illustrate the contrast.

DIAGNOSIS VS PROGNOSIS: THE ESSENTIALS

A diagnostic model estimates the probability that a person currently has a condition. The patient presents with symptoms, and we want to know: do they have the disease or not? A preferred design is a cross-sectional study, where both predictors (like symptoms or test results) and the outcome (the disease status) are measured at the same time. Prognostic research, in contrast, estimates the likelihood of a future outcome, like disease, death, complications, or recovery. It requires follow-up and deals with censored data (e.g., when a patient drops out of the study or has not (yet) experienced the outcome) (1). These studies are preferably longitudinal in design. Van Smeden et al. (2021) illustrate this distinction well: diagnostic research answers: "What is the probability of a disease being currently present, while prognostic research explores: "What is the probability of developing a disease over a specific time period".[1]

EXAMPLES

To make things more concrete, let's look at three studies that exemplify these concepts.

A patient comes in with leg pain and swelling. Do they have a Deep Vein Thrombosis (DVT)? The Wells rule helps clinicians answer that by assigning points to clinical features (e.g. recent surgery, malignancy, previous Pulmonary Embolism (PE) or DVT), categorizing patients into low, moderate, or high probability of DVT or PE. In a meta-analysis by Geersing et al. (2014) involving over 10.000 patients, the rule was shown to be highly effective, but only when used in combination with a negative D-dimer test. Patients with an unlikely score on the Wells rule and negative D-dimer were associated with an extremely low probability of DVT (1.2%, 95% confidence interval 0.7% to 1.8%).[2] However, the rule performed less well in patients with cancer or prior DVT; a reminder that diagnostic models need validation adjusted for patient context.

Another example: testing for SARS-CoV-2 using saliva instead of the traditional nasopharyngeal swab. A study by Samsunder et al. (2024) found that saliva testing had moderate sensitivity (70–81%) and specificity (76–79%).[3] This is textbook diagnostic research comparing test performance against a reference standard (nasopharyngeal RT-PCR), measured in real-time during infection.

Now consider a different question: how long is a 78-year-old with multiple chronic conditions and polypharmacy likely to live? That's a prognostic question. Gastens et al. (2025) developed a life expectancy estimator using data from

over 800 patients aged 70+. They included predictors like age, weight loss, number of drugs, and functional status variables. Their model predicted 3-year mortality and translated it into estimated life expectancy.[4] This is valuable because decisions such as whether to start a statin or screen for cancer often depend on expected lifespan. These type of calculators are advanced forms of risk models commonly visualized using nomograms.

To illustrate how these scoring systems work, whether for diagnosis or prognosis, consider Figure 1, which shows a nomogram developed to estimate a patient's risk of severe COVID-19 at hospital admission. While the goal here is prognostic rather than diagnostic, the structure is the same: predictors (such as age, neutrophil count, lymphocyte count, albumin, and LDH) are translated into a points system. The points for each predictor are summed, and the total is used to determine a risk estimate.

WHY THE DISTINCTION MATTERS

Diagnostic and prognostic studies require similar statistical approaches. Both prognostic and diagnostic models aim to assess discrimination: how well the model distinguishes between outcomes (e.g. C-statistic or Area Under the Curve (AUC)) and calibration, which measures how closely predicted probabilities match observed outcomes. A difference is that diagnostic models place greater emphasis on sensitivity, specificity, positive predictive value and negative predictive value. Both diagnostic and prognostic models need proper validation such as internal and ideally external validation, before being used in practice.

However statistical approaches might be similar, diagnostic and prognostic models serve different clinical goals:

diagnostic models guide immediate decisions: "Should we treat now or test further?" Prognostic models aid in planning: "Should we intensify care? Start palliative care discussions? Monitor closely?".

CONCLUSION

Diagnostic and prognostic research both aim to support clinical decision-making, but they do so in fundamentally different ways. Therefore, the next time you encounter a prediction model, consider whether we are diagnosing the present or predicting the future.

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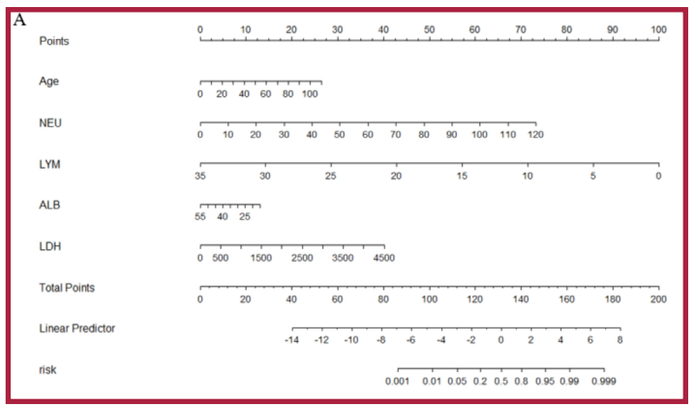

FIGURE 1 Nomogram model predicting severe COVID-19. The total points projected on the bottom scales indicate the probabilities of severe COVID-19. Instructions for nomogram use: (1) Locate the points value corresponding to each variable for each patient on the nomogram; (2) Sum the points value corresponding to all variables to obtain the total points value: (3) Use the total points value to query the linear predicted value and the risk of outcome events (5).

Gamifying Education with the Compendium App

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Gamification has gained increasing attention as a method to enhance studying effectiveness over the last decade. Research done on the implementation of gamification to enhance studying outcomes has reported mixed results across different educational levels and study fields. However, a significantly positive correlation has been found between gamification and student motivation, engagement, and learning outcomes in students of secondary and higher education. This correlation was especially strong in "beta" fields, such as physics and biology.[1] Many institutions – especially in the USA – have already implemented gamification in their obligatory curriculum or offer gamified courses as additional training. While it is still too early to confirm or reject their effectiveness with certainty, the potential of these gamifications can not be refuted.[2]

In order to promote gamification in medical education, and as believers of the positive impact gamification can have on study outcomes, we at Compendium Geneeskunde have published an app called the Compendium App. In our app, we provide quizzes for more than thirty five different fields in medicine in both Dutch and English. The Compendium App is also regularly updated with new features and improvements, and, most importantly, continuous new content. This has resulted in 45 levels for each field, with each level containing five questions, altogether good for more than eight thousand questions at the moment of writing (and counting).

Students, medics, paramedics, and those interested can go through the levels per medical field, or choose one of our two special modes: the shuffle, which selects five completely random questions for a quick review; and the battle, which is about gaining the most points on ten randomly selected questions in the least amount of time. The top 3 of our monthly battle win an invitation to our quarterly, where they can meet the team of Compendium, and take home a more than rightfully earned trophy.

To ensure the content is always up to date, we rely on our "Compendium Geneeskunde 2.0 Vijfdelige Reeks" (a series of five books, entailing 35 fields of medicine), which contains all the essential and relevant information every doctor should know after graduating medical school. Additionally, the pockets "EHBO" (first aid), "Kleine Verrichtingen" (minimally invasive interventions), and "Radiologie" (radiology) are also used. The contents of these books are reviewed every three to five years, and are updated according to the most recent reliable guidelines. This ensures the Compendium App is nearly always up to date.

At Compendium we firmly believe in the idea of "bringing healthcare together". This means that we cannot do it by ourselves, but will always need the help of other professionals in the field. For the app this means that we allow users to give their feedback, and that we review their feedback carefully, and implement it accordingly. We might be quicker on our own, but it is only together that we can go further.

Ending on that note, we cordially invite you to our Compendium Community and hope you will follow the thousands before you and install the Compendium app. Scan the QR code to get started, and let us battle and learn together! We'll be waiting for you at our quarterly.

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A disease in disguise

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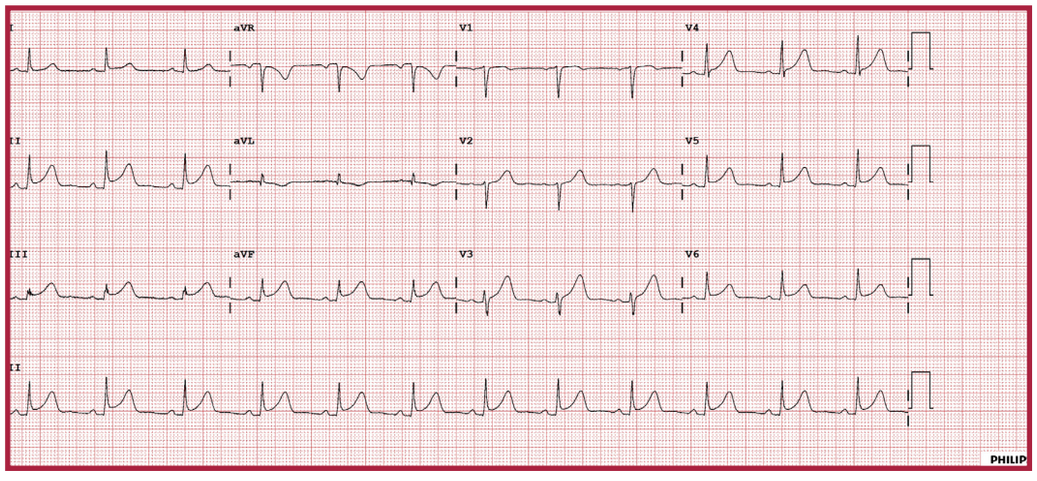
CASE

A 61-YEAR-OLD WOMAN, with no prior medical history, presents to the emergency department with a sudden-onset chest pain. The pain does not radiate to the jaw or neck, but both arms feel heavy. Vital signs are stable, except for an elevated blood pressure of 160/96 mmHg, and physical examination reveals no cardiac or pulmonary abnormalities. Lab testing shows a troponin-I of 415 ng/mL (ref. 0-20). A cardiac ultrasound demonstrates a normal left and right ventricular function, with no atrial abnormalities.
The following ECG was obtained:



QUESTION 1

Based on the clinical presentation and ECG, what is the most likely diagnosis for this patient?

A. ST-elevation myocardial infarction (STEMI)
B. Pericarditis
C. Perimyocarditis
D. Takotsubo cardiomyopathy

QUESTION 2

What is the recommended course of treatment for this patient?

A. Ascal + P2Y12 inhibitor
B. Emergency Percutaneous Coronary Intervention (PCI)
C. Stress reduction
D. NSAID + colchicine

Answer on page 29

Twist, Pop, and a Radiographic Surprise

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1 MD/PhD Candidate, Department of Orthopedic Survgery and Sports Medicine, Amsterdam UMC.
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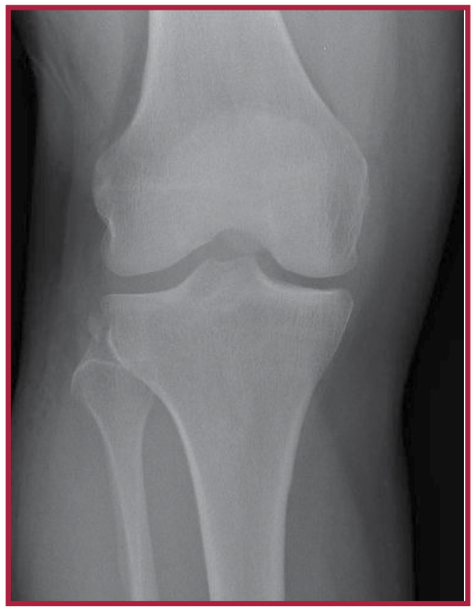

Photo courtesy of: G. Garnder, Radiopaedia.com, Image 9357, rID 13910”

CASE

A 24-YEAR-OLD HEALTHY FEMALE soccer player presents to the Emergency Unit. Today at the soccer field, she felt a sharp pain in her right knee while changing directions. The knee is now swollen, hurts and she is unable to bear weight. Anterior drawer test is posivtive and an anterior cruciate ligament (ACL) tear is suspected. Palpation of the joint line is not especially

What is the additional pathology that can be found on this radiograph?

A. Arcuate sign
B. Segond fracture
C. Tibia plateau fracture
D. Osgood-Schlatter Disease

Answer on page 30

Starting a Robotic Mitral Valve Surgery Program: Focus on Safety and Learning Curve

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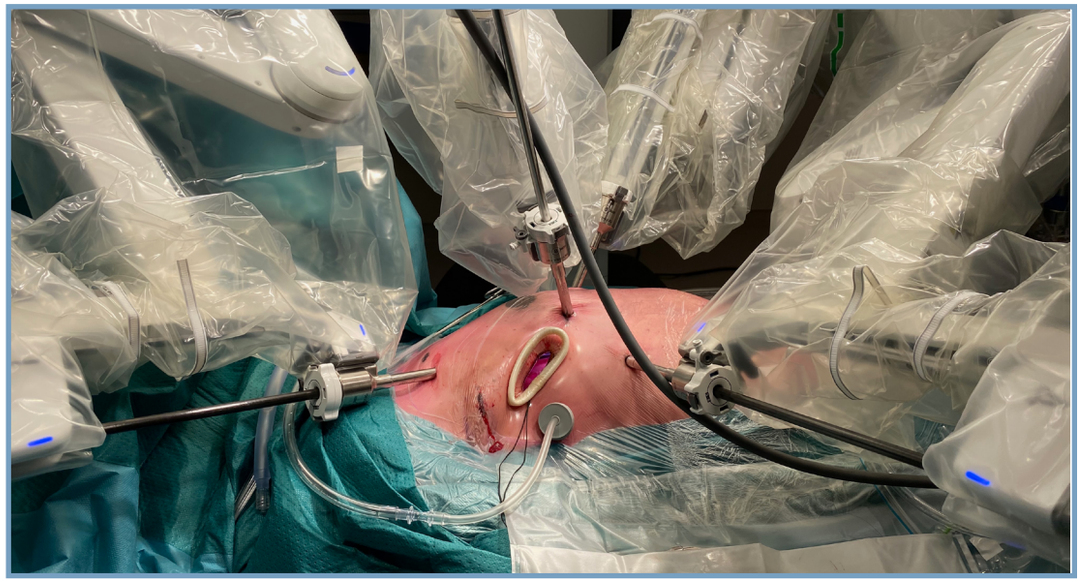

FIGURE 1 Surgical setup for robotic MV surgery

Mitral valve (MV) repair through median sternotomy has been the gold standard for treatment of severe primary mitral regurgitation1. However, with the aim of reducing surgical impact on patients while preserving safety and surgical outcome, robotic mitral valve surgery has emerged as a minimally invasive approach2-3. To ensure optimal outcomes and maintain efficacy, the entire surgical team has to master the mandatory learning curve that accompanies this minimally invasive approach. A dedicated robotic MV repair team in a high-volume MV repair center with no prior experience with port-access MV repair, collectively followed an extensive training program, including dry- and wet lab training and several hours of robotic simulation training. After training and performing a prospective risk analysis to identify possible risks in the initiation phase, the first 9 procedures were accompanied by an experienced proctor. A total of 98 patients underwent robotic mitral valve surgery. The initial repair rate was 100% and no mortality, postoperative stroke or myocardial infarction were observed. Over time, we observed a decrease in mean cardiopulmonary bypass times (first 20 cases: 299 minutes vs. last 20 cases: 180 minutes), mean aortic cross-clamp times (first 20 cases: 184 minutes vs. last 20 cases: 111 minutes) and mean total operating times (first 20 cases: 415 minutes vs. last 20 cases 239 minutes). At mid-term follow-up, repair rates were excellent MR < 2+ 96% and in both early and late groups one MV re-operation).

In conclusion, a robotic mitral valve repair program can be safely implemented in a high-volume mitral valve repair center with no port-access experience showing with excellent short- and mid-term results. It may be considered a valuable alternative to port-access mitral valve repair surgery for selected patients.

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Poupart's ligament

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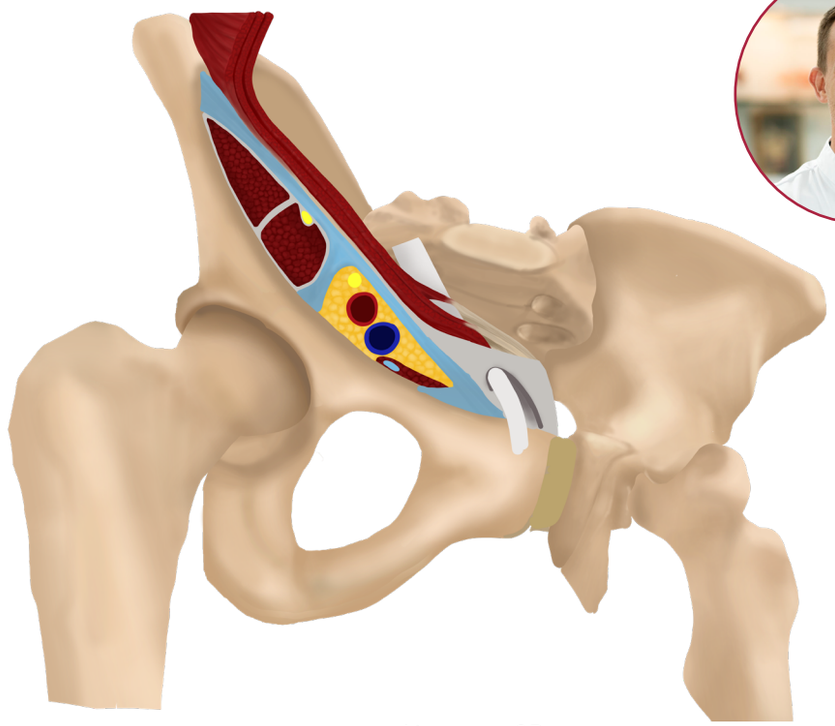

FIGURE 1 Ligament of Poupart, Credit to Julliette van Limbeek

CASE

A 55 YEAR OLD MALE is visiting the surgical outpatient clinic with complaints of a bulge in his left groin for the past year. Initially small, it has grown in recent months, causing nagging pain during his work as a plasterer. Heavy lifting makes the swelling protrude, and it is difficult to reposition. On physical examination, a soft, non-tender mass is palpated in the left inguinal region, becoming more pronounced during the Valsalva maneuver. There are no signs of redness or entrapment. The doctor diagnoses him with a classic hernia inguinalis and explains that it is caused by a weakness in the abdominal wall causing the peritoneum, abdominal fat or intestines to bulge. As it is symptomatic, elective surgery is recommended.

INGUINAL HERNIAS have likely existed since the earliest stages of human history, with written proof in manuscripts from Mesopotamian and Egyptian cultures. Over time, many have studied the anatomy and surgical techniques to repair inguinal hernias1. After elaborate studies in anatomy,

François Poupart (1661-1709) recognized the importance of the inguinal ligament in hernia pathology in 1695,

building on earlier descriptions by Gabriele Falloppio (1523-1562). Poupart's elaborate and accurate description of the inguinal ligament, calling it '*le suspenseur de l'abdomen*', and emphasizing its role in hernia repair, led to the ligament being eponymously named after Poupart[2].

The ligament of Poupart (Figure 1) extends from the anterior superior iliac spine of the ilium to the pubic tubercle of the pubic bone. It is formed by the external abdominal oblique aponeurosis and is continuous with the fascia lata of the thigh. The inguinal canal, located just above this ligament, contains the nervus ilioinguinalis, the funiculus spermaticus (males), and the ligamentum teres uteri (females). The structures lying deep to the inguinal ligament from lateral to medial are the following

- Nervus femoralis cutaneous lateralis
- Nervus femoralis
- Arteria and vena femoralis
- Inguinal lymphatic channels and lymph nodes
- Musculus iliopsoas, - pectineus and - adductor longus[3].

Inguinal hernias are classified as direct or indirect, depending on their origin.

Indirect hernias result from a congenital defect when the processus vaginalis fails to close after testicular descent, leading to a weakness in the abdominal wall. Direct hernias develop later in life due to acquired weakness in Hesselbach's triangle, bordered by the rectus sheath medially, the inguinal ligament inferiorly, and the inferior epigastric artery laterally, often caused by aging or strain. During fetal development, the testes descend through the inguinal canal, guided by the gubernaculum. In females, the canal is narrower as the ovaries remain in the pelvis, making hernias less common[4].

Since François Poupart's detailed description of the inguinal ligament, surgical approaches for hernia repair have evolved,

with Eduardo Bassini's reconstruction laying the groundwork and Irving Lichtenstein's tension-free repair reducing recurrence rates. TODAY, open and laparoscopic techniques offer effective solutions. In the Netherlands, where hernia repair is among the most commonly performed surgeries[5], a thorough understanding of inguinal anatomy, including Poupart's ligament, is essential for achieving successful outcwomes and ensuring patient safety.

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Virtual And Augmented Reality in Stroke Rehab: Revolution for all patients or just the privileged?

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2 Darul Qalb
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Epidemiological studies suggest that an estimated 25% of individuals suffer a stroke in their lifespans, making it the second most common cause of death and one of the main causes of disability in adults worldwide. Conventional therapies like constraint induced movement therapy can involve forcibly preventing the use of a patient's functional limb. These therapies, though established to be beneficial, tend to become monotonous for patients as they rely on mundane and tedious exercises. In the long run, these iterative and low engagement movements may adversely impact the mental well-being of not only the patients, but their caregivers as well. Long hours of monitoring and providing assistance to the patients is a psychological burden that has been associated with high prevalence of depression among caregivers for stroke patients.[1]

Virtual Reality (VR) and Augmented Reality (AR) are novel technologies that have shown to help patients and reduce caregiver load. Using these immersive technologies, multiple sensory modalities can be leveraged to better suit a patient's needs and demands. Studies investigating these therapies show that they may be more successful in stimulating the brain and facilitating neuroplasticity as opposed to traditional cognitive and physical retraining.[2,3] Patients report they felt more challenged by the VR interventions and they tend to engage more in virtual tasks as opposed to exercises performed by the conventional equipments.[4]

These technologies, however, can be expensive and thus unavailable to patients of low- and middle-income countries (LMICs). Even affordable rehabilitation systems based on video game consoles can be around €810 per person.[5] This poses a serious question: **IS HEALTH CARE ACCESSIBLE FOR EVERYONE, OR IS IT RESERVED FOR THOSE PRIVILEGED ENOUGH TO AFFORD IT?** Studies on the use of VR/AR in stroke rehab show promising data, significantly improving patient mobility and caregiver strain. This could revolutionize rehab and allow better care for those affected, leading to a significantly improved life. But the majority of these studies highlight advancements in high income countries, while nearly 75% of stroke cases occur in LMICs. The focus needs to shift to more affordable, low-cost alternatives for all. Without equitable access, VR/AR becomes just another tool for a select few and not a solution for the vast majority,thus risking widening global disparities.

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MEET OUR TEAM

AMSj Board '25 - '26

ROSA, *Chair '25 - '26*

Hi, I'm Rosa, the new chair of AMSj!
I heard about the journal from fellow students who were all contributing to AMSj in different ways, from general board member to student reviewer. They were always very enthusiastic about how AMSj was the perfect way for students to get more familiar with scientific research, either by reading it or by getting published. And I guess this enthusiasm was contagious!

As chair, along with the rest of the general board, I oversee that we keep AMSj on track with its goals. We work together with the editorial board to publish the journals, participate in the organization of the Nicolas Tulp Symposium and set up journal clubs.

In the future I think as AMSj we would like to maintain our quality while improving our reach within the medical community. This way we can inspire even more students and contribute even more to the field of scientific research.

RENSKE, *Vice Chair '25 - '26*

I'm Renske Dutilh and I am the new vice-chair of AMSj!

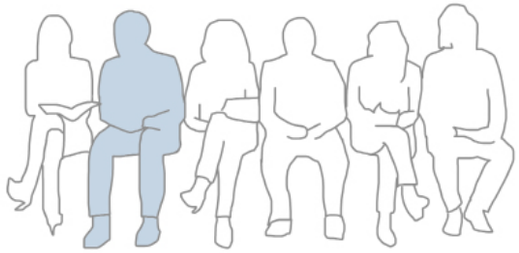
When I first came across AMSj, I was drawn in because of the pretty designed journals lying around the hospital. I was surprised and impressed to learn that it was entirely student-run. I thought it was such a cool initiative and I knew I wanted to be a part of it. As the new vice-chair, my main responsibility is helping coordinate the team and ensuring that everything runs smoothly behind the scenes. I believe AMSj plays an important role for medical students by offering early exposure to research. It opens doors, sharpens critical thinking, and helps students grow beyond the standard curriculum. Looking ahead, I'd love to see AMSj expand its reach and become more well-known on a national level. There's so much potential in what we do, and I hope even more students across the country can benefit from it.

FABIËNNE, *PR '25 - '26*

I initially found out about AMSj in the medical library and have been receiving their journal for the past three years. I didn't think I was that interested in research at first, but during my bachelor thesis I got some great guidance that really sparked my curiosity. Since then, I've found research super interesting and I'm excited to see where it takes me. I also wanted to play a more active role in helping share the journal with others.

This year, I joined AMSj as the Public Relations Manager. I'm the person behind our Instagram and LinkedIn accounts, and I also reach out to companies for collaborations and support. Even though I just started this month, I'm really happy to be part of the team and excited to see how things unfold this year.

I think AMSj's biggest contribution to medical students is showing that research isn't just for professors or experts. It's super accessible, and AMSj helps make it feel more like something we can all get involved in. It's really motivating to see what other students are doing and how their research can have an impact.



ISABELLA, *Secretary '25 - '26*

Hi everyone! I'm Isabella, and I first got to know AMSj during the third year of my Bachelor's in Health & Life Sciences, when I was made aware of the opportunity to submit your thesis, which is an exciting opportunity as a first step into the academic world. In the years that followed, during which I started studying Medicine, I've always enjoyed reading the new editions. I find it truly inspiring to see what my fellow students are writing and researching.

I'm happy to now be a part of the organization. As Secretary, I'm responsible for distributing the new editions, our website, membership administration, and the minutes of our meetings.

AMSj is so valuable, not only because publishing your own research is such a great learning experience, but also because reading the work of others can be incredibly impressive. I hope we can increase awareness among students even more in the coming year, because I truly believe AMSj is a valuable academic platform for every student!

SIETSKE, *General Board AMC*

My name is Sietske Gibson and I'm a Biomedical Sciences student at the University of Amsterdam. I first found out about AMSj through a group chat where someone shared an opportunity to join the team. The idea of contributing to a student-led academic journal immediately appealed to me.

As a general board member representing the UvA, I help organize the AMSj Journal Clubs and the Nicolaes Tulp Symposium. These events are designed to engage students in academic discussion and research, and to bridge the gap between medical theory and scientific practice.

Despite not coming from a medical background, I've always felt included and encouraged to contribute. The team is full of motivated students and supportive professionals, and it's been great to learn from and work alongside them. I believe AMSj plays a crucial role in making research approachable for students, offering a platform where they can gain experience in publishing, critical thinking, and scientific communication.

In the future, I'd love to see AMSj broaden its scope to include more content relevant to Biomedical Sciences. Expanding the range of topics could make the journal even more valuable to students from various academic disciplines within the health and life sciences.

SUZANNE, *General Board VUmc*

I have been following AMSj on Instagram since my Bachelor's degree, and since that was a while ago, I do not even remember how I found out about the journal. Eventually, I joined the team myself after seeing a vacancy shared in a story by a fellow student.

I currently serve as a General Board Member. In this role, I support fellow team members and focus primarily on organizing activities — the highlight being the Nicolas Tulp Symposium, which we host in collaboration with the KNMG.

My experience within AMSj has been very positive. We work with a motivated yet fun group of students and manage to create engaging and interesting projects together.

I believe AMSj plays an important role in medical training by making scientific research more accessible to students, both in terms of reading and publishing, and by inspiring their enthusiasm for research.

In the future, I hope that every medical student will know about AMSj, and, of course, be an active reader!

Rosa Muiderman

Renske Dutilh

Fabiënne de Boer

Isabella Ghauharali

Sietske Gibson

Suzanne Veen

MEET OUR TEAM

Bacteriophage therapy: an innovative approach against antibiotic resistance

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The rise of antibiotic-resistant bacteria represents one of the most critical challenges in modern medicine. Infections caused by multidrug-resistant (MDR) bacteria are increasingly difficult to treat. Bacteriophage (or phage) therapy, an antimicrobial treatment that has existed for over a century, is therefore gaining renewed interest.[1] It offers a potentially targeted, commensal-sparing, and personalized alternative to conventional antimicrobial therapies.

Phages can selectively infect and lyse bacteria. Upon infection, phages bind to specific receptors on the surface of their bacterial host and inject their genomic material. This induces the host to synthesize new phages. Additionally, the phage infection causes the host to produce endolysins, which degrade the bacterial cell wall, ultimately leading to lysis of the bacterium.

The release of new phages from the lysed bacterium causes infection of neighboring bacterial cells, leading to a cycle of infection and replication (see Figure 1).

This targeted mechanism allows phages to specifically eliminate harmful bacterial strains while sparing the commensal flora when administered. Human feces, alongside other bacteria-rich environments such as sewage, serve as accessible sources for isolating therapeutic phages.[2]

Preclinical research has shown the efficacy of customized phage cocktails in reducing the abundance of pathogens in infections, such as Klebsiella pneumoniae, certain Escherichia coli, and Pseudomonas aeruginosa. Mouse studies on the colon in IBD research show that phage administration indeed has bactericidal effects, and improves tissue histology, reduces pro-inflammatory cytokines, and enhances clinical outcomes.[3,4,5] Phage therapy is currently being researched in wide-ranging experimental clinical trials. This includes applications for pulmonary infections in cystic fibrosis caused by MDR P. aeruginosa, as well as prosthetic joint infections and recurrent urinary tract infections.[6,7,8]

While these experimental studies suggest promising outcomes, phage therapy faces several challenges. Bacterial resistance mechanisms and the capability for promoting the growth of other harmful bacteria remain concerns.[3]

Moreover, commercial development is hindered by the need for frequent therapy adjustments due to bacterial evolution.

Furthermore, as a novel experimental treatment, this therapy generates apprehension and uncertainty about its applications, and healthcare professionals' unfamiliarity with the approach poses significant challenges for its integration into established treatment protocols.[9]

While challenges remain, continued research and innovation may help establish phage therapy as a potentially feasible option alongside conventional antimicrobial therapies such as antibiotics. Its targeted approach offers hope for more effective and personalized treatments against resistant infections. As understanding grows, phage therapy could play an increasingly important role in future infectious disease care.

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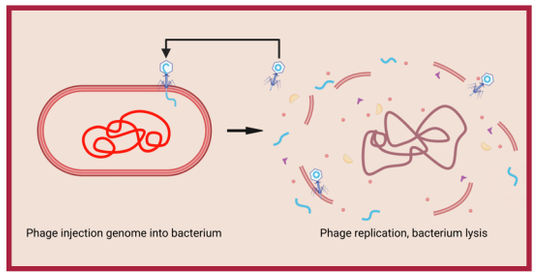

FIGURE 1 Bacteriophages cause bacteria to lyse.[10]

Left Posterior Pericardiotomy: A Change of Heart

Angelique F.O. Emiola [1,2] and
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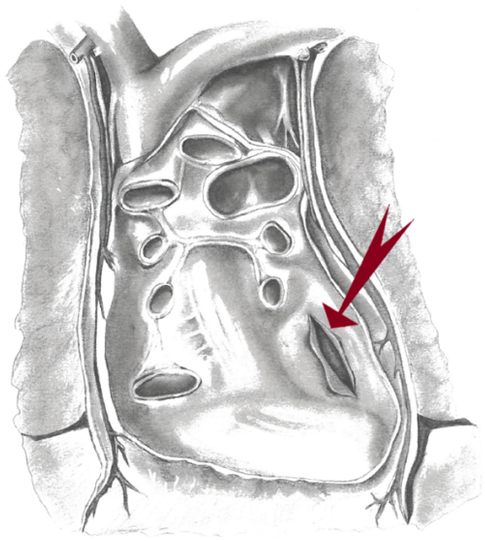

FIGURE 1 Posterior pericardiotomy: artist representation of the incision (red arrow). Reprinted with permission from Gaudino M, Sanna T, Ballman KV, et al. Posterior left pericardiotomy for the prevention of atrial fibrillation after cardiac surgery: an adaptive, single-centre, single-blind, randomised, controlled trial. Lancet 2021;398:2075–83.

LEFT POSTERIOR PERICARDIOTOMY (LPPT) is a novel technique in cardiac surgery, where one makes a small incision in the posterior pericardium to facilitate fluid drainage and prevent postoperative atrial fibrillation (POAF), a common and impactful complication that affects up to 40% of cardiac surgery patients.[1, 2] This seemingly simple intervention may be the small difference that brings about significant long-term improvement in outcomes for these patients.

POAF is a transient atrial arrhythmia that typically arises within 30 days postoperatively as a response to surgical stress and inflammation.[2] Despite its temporary nature, it is an independent predictor of increased short- and long-term mortality, prolonged hospitalisation, stroke and risk of heart failure.[1, 3] While it differs in pathophysiology from chronic atrial fibrillation—which has a more insidious onset and is not directly related to surgical intervention—POAF increases the risk of developing permanent AF up to fivefold.[4, 5]

The mechanism behind LPPT is thought to involve improved pericardial fluid drainage into the pleural space, thereby reducing inflammation and mechanical stress, both key contributors to POAF.[6, 7] This drainage safely prevents pericardial effusion and its arrhythmogenic potential. A recent randomized controlled trial demonstrated a 47% relative risk reduction in POAF following LPPT, with no reported procedural complications.[8, 9] The anatomical approach is well described, reproducible, and considered safe.[10]

In light of these findings, LPPT is recommended in the latest 2024 European Society of Cardiology guidelines as a new standard of care.[11] Nonetheless, implementation in Dutch clinical practice remains limited. To date, only a few early adopters have incorporated LPPT routinely, primarily due to a previous lack of large-scale evidence.[12] The current gap between evidence and implementation highlights the need for a pragmatic solution.

To address this, we propose an implementation trial using a stepped wedge design across cardiothoracic centres. This design allows for gradual, systematic adoption in all participating centres, while enabling robust data collection on outcomes in a real-world context.[13] As LPPT becomes standard surgical care within each cluster for all patients, informed consent will be obtained at centre level. A waiver for individual informed consent will be requested, as the intervention is applied at institutional level and cannot be selectively withheld from individual patients within a participating centre.[14] Our aim is twofold: to improve national uptake of this new standard of care, and to evaluate the effectiveness of LPPT across the full spectrum of cardiac surgery patients, ensuring that innovation translates into impact.

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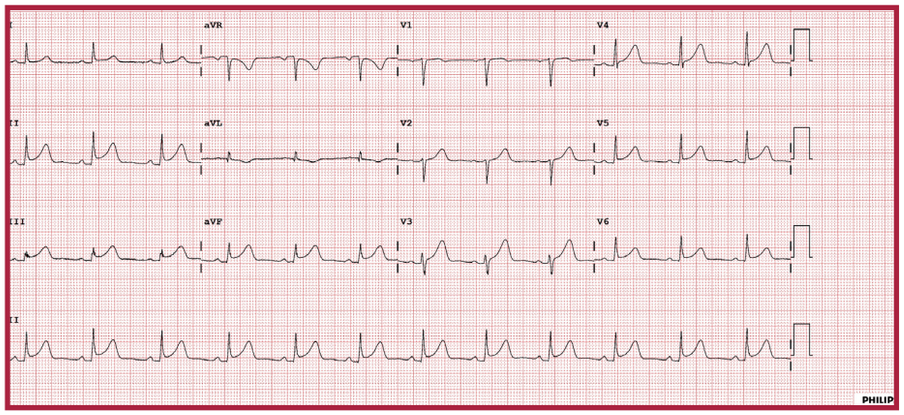
IMAGE: UNSPLASH.COM

Answers '*A disease in disguise*'

Wietske van der Wielen[1], Ilja van Lingen[2], L. de Nooij[3]



Correct answers: 1C, 2D

EXPLANATION

The patient was admitted to the cardiology department with a suspected case of perimyocarditis. The initial diagnosis for this patient was STEMI, however, coronary angiography revealed no significant stenosis. In addition, no reciprocal ST-depressions – which are typically present with STEMI[1] - were found on the ECG. The combination of diffuse ST-segment elevations, PTa depression and Spodick's sign (i.e. a downsloping TP-segment) was suggestive of a pericarditis[2]. However, in pericarditis, troponin-I is typically normal or only mildly elevated[3]. In this case, the elevated and rising troponin-I levels point to myocardial involvement, making perimyocarditis the most likely diagnosis. Takotsubo cardiomyopathy was an unlikely diagnosis, as it is typically associated with systolic dysfunction on cardiac ultrasound[4].

Ascal and a P2Y12 inhibitor (which include clopidogrel and ticagrelor), and an emergency PCI would be necessary treatments for a STEMI/NSTEMI, to treat a suspected coronary stenosis. This would not be useful for this patient, as there was no stenosis. Stress reduction and supportive care are the recommended approaches for Takotsubo cardiomyopathy, as this disease is often triggered by intense emotional stress (hence the term 'Broken Heart Syndrome')[3]. In this case, the patient was prescribed Ibuprofen 600mg three times daily on a tapering schedule + Colchicine 0.5mg twice a day for three months.

The patient remained in the hospital for 48 hours until symptoms sufficiently resolved for the patient to be discharged with medication. The patient was advised to avoid sports and other heavy physical activity for six months. Follow-up with a cardiologist continued through the outpatient clinic.

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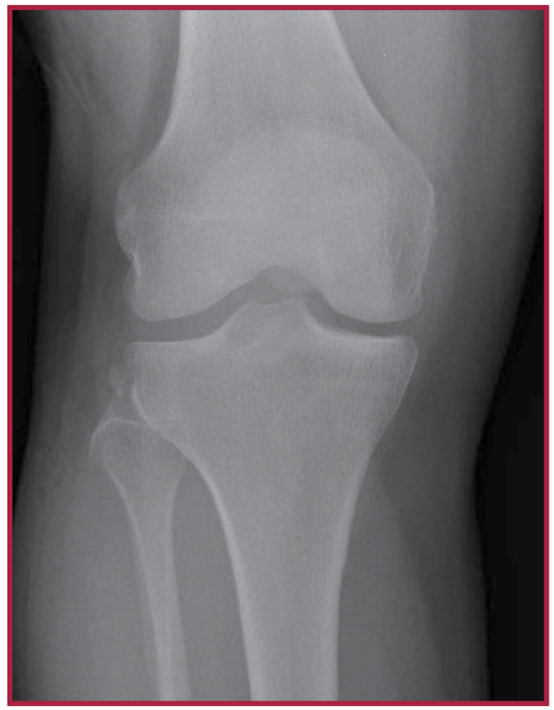
Answers '*Orthopedic Surgery*'

Jens P. te Velde, BSc[1] and
Mees K. Hesmerg, MD[2]



Correct answers: B

EXPLANATION

This radiograph shows an avulsion fracture of the lateral proximal tibia, also known as a Segond fracture (answer option B). As first described by French surgeon Paul Segond (1851-1912), this fracture is almost always associated with ACL tears. The radiograph shows a bone fragment laterally to the tibial plateau, also referred to as the lateral capsular sign. If a Segond fracture is found on radiographic examination, ACL integrity should always be assessed through physical examination or further imaging.

The arcuate sign is an avulsion fracture of the lateral fibula rather than the tibia, although also associated with cruciate ligament injury.

High-energetic trauma mechanisms with external force are a more frequent cause of tibia plateau fractures in young healthy patients compared to non-contact sport injuries. Typical severe joint line tenderness is absent in this patient. No fracture lines are seen in the tibia and no depressions can be seen at the articular surface.

Osgood-Schlatter disease is primarily seen in physically active children (especially boys) around 14 years of age. Swelling and pain are reported at the tibial tuberosity, which worsens with activity. Although occasionally cartilage or bony fragmentation is seen on radiographs, these are usually located at the tibial tuberosity.

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4. Reference picture: Image 9357, courtesy of G. Garnder, Radiopaedia.com, rID 13910"

Answers '*Diagnosing Midfoot Pain After Trauma*'

Charlotte H. Roelofsz[2], Matthijs J. van Ee[1], Prof. Dr. Mario Maas[2]

Correct answers: 3B; 4D

EXPLANATION

Initial X-ray and CT imaging show an avulsion fracture at the base of the 2nd metatarsal and a midshaft fracture of the 3rd metatarsal.

Only after observing the diastasis between MT1 and MT2 on the weight-bearing X-ray was the patient diagnosed with a Lisfranc injury. This is a fracture or ligamentous disruption of the tarsometatarsal joint complex, which includes bones and ligaments connecting the cuneiforms and cuboid to the bases of the metatarsals. This complex is essential for midfoot stability. Lisfranc injuries typically occur through direct trauma, such as crush injuries, or indirect trauma like hyperplantarflexion and rotation, often during sports activities.[1]

Although Lisfranc injuries account for only 0.2% of all fractures, they are missed in 20–50% of cases.[2] Missed diagnoses can result in serious complications, including midfoot arthrosis, collapse, and deformity.

When clinical presentation indicates Lisfranc, X-ray and CT are typically the first imaging modalities used. However, as seen in this case and with the number of diagnoses missed, it is recommended to obtain weight-bearing X-rays, since diastasis can be too subtle to detect on non-weight-bearing imaging. MRI can also provide additional value in visualizing ligamentous injuries.[3]

Treatment often requires surgical fixation of the joint to restore alignment and prevent long-term complications.[3]

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Colophon

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