COLD AGGLUTININS AND CARDIAC SURGERY –

WORKING TOGETHER TO SOLVE A MYSTERY

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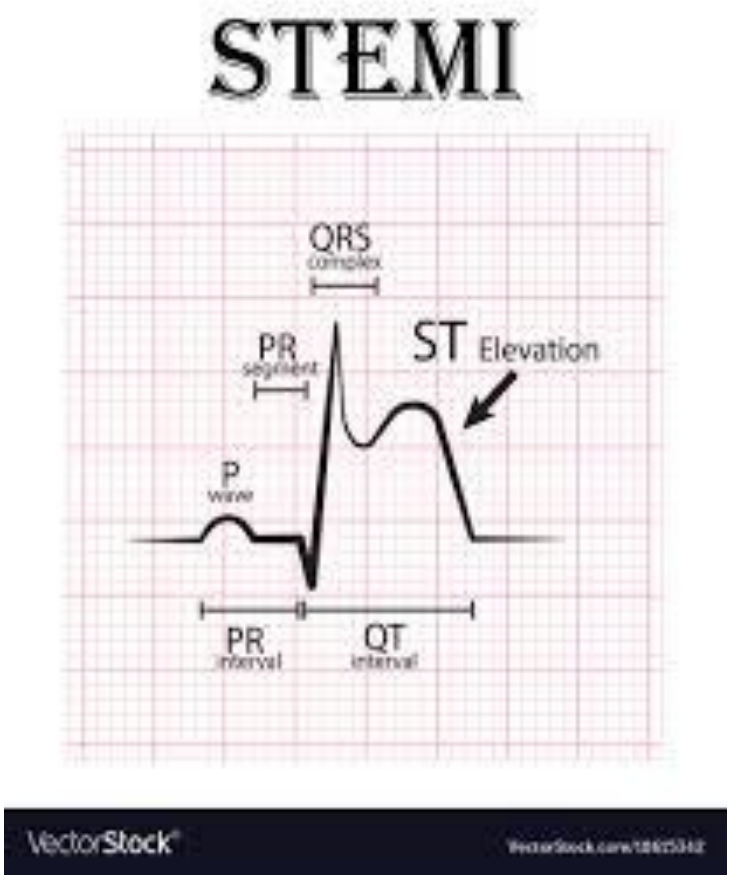
Case Study



- Female patient mid 70s

Presenting Complaint:
- Acute ST elevation myocardial infarction (STEMI)

Past Medical History:
- Congenital factor XI deficiency
- Alcoholic Liver Cirrhosis
- Myocardial Infarction
- Hypertension
- Multiple other comorbidities – a poorly lady

Treatment:
- Triple Coronary Artery Bypass Graft (CABG)
- Mitral Valve Repair
- Subsequent sternal wound infections and visits to theatre for VAC dressings
- Ongoing need for transfusion

Concerns - Intra-operative

- Heart arrested with cold blood cardioplegia (4C as is routine) and the patient cooled to 34C
- ‘Red cell clumping’ seen in the cardiac veins, surgeon assumes cold agglutinins and rewarms patient to 37C
- Theatre calls BT lab to ask about cold agglutinins. Lab states they have no record of cold agglutinins for this patient.
- Heart is washed out of clumps & surgery proceeds safely.
- Post-op cold agglutinin titres completed: strong positive

Concerns - Ongoing

- The following days and weeks see increasing numbers of requests for full cold agglutinin titres on patients undergoing cardiac surgery.

- This includes patients with warm and cold reacting antibodies and any who had an initially high MCHC retested after the sample was warmed “FBC comment *Sample may contain a cold agglutinin tested at 37C*”

- With staffing pressures the laboratory can not offer cold agglutinin testing for every cardiac patient.

Lets work together

Problem…

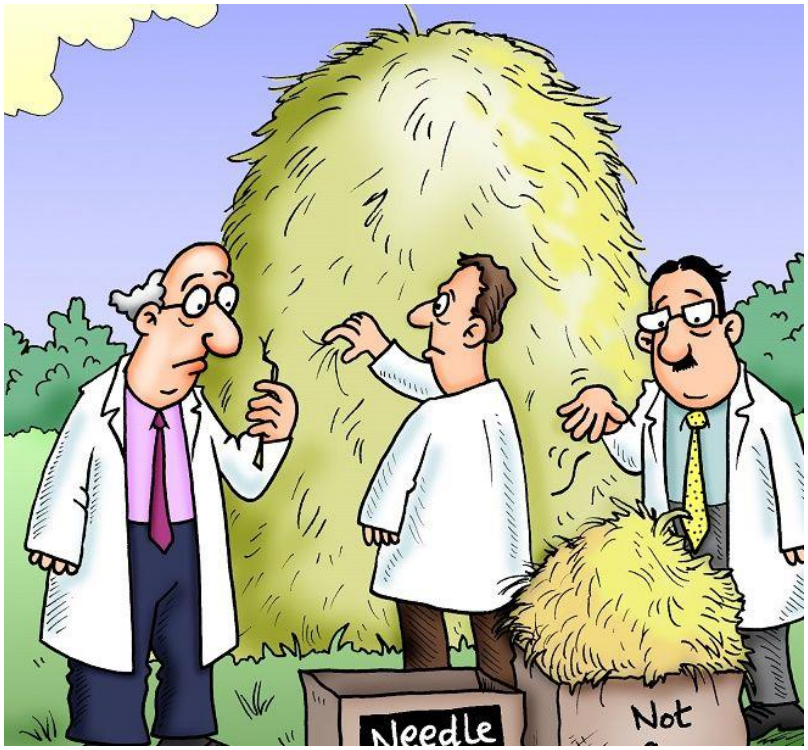
- Need to identify patients with cold agglutinin disease having cold cardioplegia
- Insufficient resource and inappropriate to test all
- Which patients are at risk and need testing?

Multidisciplinary team working:

- Met together, understood each others pressures, brainstormed a process
- Critical temperature 34ºC

UHS cardiac surgery in numbers

- Bypass Surgery - About 7 adult and varying numbers of paediatric patients per day undergo bypass surgery - vast majority of these include cold blood cardioplegia.



Identifying these patients

1. Clinical symptoms

   BUT - this particular patient had no clinical signs of Cold Agglutinin Disease (jaundice, pallor, Reynaud's or haemoglobinuria) so this may not be reliable.

2. A simple marker in pre-op bloods?

   Strong correlation between an abnormal MCHC and CAs

   Validation carried out to prove theory

   30 samples tested - *Strong correlation between patients with MCHC above 360 and presence of cold agglutinins.*

However, some of these patients may have a normal MCHC result and will only be identifiable by their clinical history and will ***not be picked up by this screening process.***

Eureka!

A new process - responsibilities

- Identification of these patients is a **joint effort** between the haematology and blood transfusion laboratories and the clinical team.

Haematology Laboratory:

- If MCHC > 360: Add comment: “Sample may contain a cold agglutinin, tested at 37C”

Cardiac Team:

- Review MCHC result in the pre op FBC results.
- If above comment seen on the complete FBC result, contact the BT Laboratory to arrange for a CA Screen.
- Good clinical history

New process - responsibilities

Blood Transfusion Laboratory:

- Run Cold Agglutinin screens as requested
- Run Thermal Amplitude test at **4C, RT, 34C and 37C** for those with a positive screening result.

But – UHS tertiary referrals and urgent cases

- Review cardiac list the day before surgery to identify any patients at with an MCHC > 360 without a CA screen.
- Run a CA screen for these patients and inform the appropriate person of any positive result ASAP with a message for the anaesthetist to discuss a plan with the laboratory before surgery.

Improved Reporting

Original reporting of
Cold Agglutinin Titre results:

Specimen comment

Amended Report Text : ** AMENDED REPORT **
4C: Adult O(I) 64 Cord O(i) 256 Patient(Auto) 256
22C Adult O(I) 2 Cord O(i) 2 Patient(Auto) 4
30C Adult O(I)Neat Cord O(i) Neat Patient(Auto) 4
37C Adult O(I)Neat Cord O(i) Neat Patient(Auto) Neat

Now:

- *Strong positive reactions seen at 4°C - Titre =>512*
- *Weak reactions seen at room temperature – Titre = 8*
- *Weak reactions seen at 34°C – Titre = Neat*
- *Negative reactions at 37°C*

Lab Comment

- *Cold agglutinin detected. Please use a blood warmer for transfusion and avoid infusing cold intravenous fluids. Discuss with the Haematology consultant and alert the cardiac surgical/anaesthetic team if the patient is due to undergo cardiac surgery"*

Clinical Alerts

- Need for blood warmer easily missed by clinical staff.
- New alerts on electronic notes act as addition to LIMS info.
  - Irradiated blood components required
  - CMV Negative blood components required
  - Antibodies present: may delay RBC issue
  - XMBTS: Crossmatch requires 24 hrs notice
  - Previous haemolytic reaction: see notes
  - **Cold Agglutinins – Blood warmer required**
  - Solid organ transplant – Inform BT lab
  - Bone marrow transplant - Inform BT lab
  - Rare antibody: Haem Cons to authorise Tx
  - Heparin Induced Thrombocytopenia (HIT)
  - Daratumumab given: may delay RBC issue
  - Previous allergic reaction: see notes

Learning points

- Shared goal – Patients First
- Learn from each other to achieve desired objectives
- CA can cause catastrophic haemagglutination and haemolysis during cold caridoplegia
- Identification of these patients = Normothermic surgery
- Clear communication between lab and clinical teams caring for the patient is essential

Be Prepared for these patients!

Questions?

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