THE NORTHERN HOSPITAL

ACS- PERCUTANEOUS CORONARY INTERVENTION

"Frau, Geschirr Scheuernd" oil on canvas, c.1736, Jean-Baptiste-Simeon Chardin.

...Not long ago in Naples, a poor man took to wife, a charming and beautiful girl, whose name was Peronella. He was a bricklayer by trade, and earned a very low wage, but this, together with the modest amount she earned from her spinning, was just about sufficient for them to live on. Now one day Peronella, caught the eye of a sprightly young gallant, who, finding her exceedingly attractive, promptly fell in love with her, and by using all his powers of persuasion, he succeeded in gaining her acquaintance. So that they could be together, they came to this arrangement: that since her husband got up early every morning to go to work or to go and look for a job, the young man should lie in wait until he saw him leaving the house...And in this way they met very regularly. But one particular morning shortly after the good man had left the house and Giannello Scrignario (such was the young gallant's name), had gone inside to join Peronella, the husband, who was usually away for the whole day, returned home!....

Now Peronella knew it was her husband from his way of knocking, and she said, "Oh alas Giannello, my love. I'm done for! That's my husband, curse the fellow, who for some reason or other has come back home. But whatever the reason, for God's sake hop into this tub over here while I go and let him in, and find out what has brought him home so early in the day". Giannello promptly got into the tub, whereupon Peronella went and opened the door to her husband, and pulling a long face she said, "What's got into you this morning, coming back so early? ....how are we going to buy anything to eat? Do you think I'm going to let you pawn my Sunday dress?!....Here I am stuck in the house from morning till night and working my fingers to the bone, so that we shall at least have sufficient oil to keep our lamp alight! Oh what a husband I have! I haven't a single neighbour who doesn't gape and laugh at me for slaving away as I do; and yet you come back here twiddling your thumbs when you ought to be out working!"....

"Oh for heaven's sake woman", said her husband...."I've made sure that we shall have enough food to last us for over a month! You know that tub that's been cluttering up the house for ages? Well, I've sold it for 5 silver ducats to this man waiting here on the doorstep!" Whereupon Peronella said, "Well that really puts a lid on it. One would think that since you are a man and get about a good deal, you ought to know the value of things: yet you sell a tub for five silver ducats, which I a mere woman, who hardly ever puts her nose outside the front door....have just sold to an honest fellow here for seven ducats! In fact he's here inside the tub right now, as matter of fact, seeing whether its sound". When he heard this, her husband was delighted, and turning to the man who had come to collect the tub he said' "Run along now, there's a good fellow. You heard what my wife said. She's already sold it for seven ducats, and all you would offer is five!"...And Peronella then said to her husband, "Now that you are here, make yourself useful, you useless man! Come up and settle the deal with this man".

Giannello was listening with both ears....and with a casual sort of air, as though he had heard nothing of the husband's return, he called out: "Are you there good woman?" whereupon the husband, who was just coming up, said: "Here I am, what can I do for you?"

"Who the hell are you?", said Giannello, "it's the woman who was selling me this tub!..."

"That's all right" said the good man. "You can deal with me: I'm her husband".

So Giannello said, "The tub seems to be in pretty good shape, but you appear to have left the lees of the wine in it, for its coated all over with some hard substance or other that I can't even scrape off with my nails. I'm not going to take it unless its cleaned out first!" So Peronella said, "We made a bargain, and we'll stick to it. My husband will clean it out!"

"But of course" said the husband And having put down his tools and rolled up his sleeves, he called for a lamp and a scraping tool, lowered himself into the tub, and began to scrape away. Peronella, as though curious to see what he was doing, leaned over the mouth of the tub, which was not very wide, and resting her head on her arm and shoulder, she issued a stream of instructions, such as, "Rub it up there, that's it, and there again!" and "See if you can reach that teeny weeny bit left at the top".

While she was busy instructing and directing her husband in this fashion, Giannello, who had not fully gratified his desires that morning before the husband arrived, seeing that he couldn't do it in the way he wished, contrived to bring it off as best he could. So he went up to Peronella, who was completely blocking up the mouth of the tub, and in the manner of a wild and hot-blooded stallion mounting a Parthian mare in the open fields, he satisfied his young man's passion, which no sooner reached fulfilment than the scraping of the tub was completed, whereupon he stood back, Peronella withdrew her head from the tub, and her husband clambered out.

Then Peronella said to Giannello: "Here take this lamp my good man, and see whether the job's done to your satisfaction". Having taken a look inside the tub, Giannello told her everything was fine and he was satisfied. He then handed seven silver ducats to the husband, and got him to carry it round to his house.

Second Story, Day Seven, Giovanni Boccaccio, The Decameron, (1350-53).

When her husband comes home from work quite unexpectedly, Peronella frantically ushers her lover into one of her larger tubs, but then she discovers to her horror that her husband has brought home a buyer for that very same tub! Peronella has only a fraction of a minute to come up with a plan. She tells her husband, that he is useless as she has already found a buyer who is willing to pay more! Giannello happily plays along with the charade to save his skin, but he was equally quick thinking himself! Having not quite "satisfied" himself that morning he grasped a very limited window of opportunity to do so. Peronella was more than happy to play along as well, especially as also she received seven ducats for her "favours".

When we encounter a patient with a STEMI, or a very high risk Non-STEMI, we must recall the story of Peronella and her secret lover! We must think on our feet most quickly, as we have only a limited window of opportunity to act - 90 minutes to PCI, but the sooner than this the better!

ACS - PERCUTANEOUS CORONARY INTERVENTION

Introduction

Percutaneous coronary intervention is the preferred emergency treatment in most cases of **STEMI.**

In is also performed for **Non-STEMI,** the timing of which will depend will depend on the risk level of the individual patient.

It is vital to have in place systems such as a **CODE STEMI** or equivalent to ensure the timely delivery of coronary angiography and percutaneous intervention.

Lines of Communication

Clear and efficient lines of communication are essential for any PCI intervention.

Current guidelines that a specific hospital **CODE** call should be activated that alerts all personnel required to perform the procedure in a timely manner.

Relevant personnel should include:

- The interventional cardiologist
- Emergency Department staff
- Angiography suite personnel
- The Coronary Care Unit

Indications

Indications include:

1. **STEMI**

   All cases suitable for intervention are done on an emergent basis.

   Current Guidelines recommend PCI as the preferred reperfusion strategy providing:

   - This can be achieved within **90 minutes** of arrival within the ED
   - Symptom onset has been within the previous **12 hours.**

2. **Non- STEMI:**

   Time frames here are according to the level of risk in a confirmed or highly probably Non-STEMI according to the level of risk.

Recommended intervention times are as follows:

Very High Risk NSTEACS:

- Patients with NSTEACS with **very high risk** criteria should have an invasive strategy **within 2 hours.**

High Risk NSTEACS:

- Patients with NSTEACS with **high risk** criteria should have an invasive strategy **within 24 hours.**

Intermediate Risk NSTEACS:

- Patients with NSTEACS with **intermediate** criteria should have an invasive strategy **within 72 hours.**

Low Risk:

- Patients with NSTEACS who have **no recurrent symptoms** and **no risk criteria** are considered at **low risk** of ischaemic events.

  They can be managed with a **selective invasive strategy** guided by **provocative testing** for **inducible ischaemia.**

Markers of increased risk of **mortality** and **recurrent** events among patients with **confirmed** acute coronary syndrome are assessed as below.

Risk Stratification amoung patients with Confirmed ACS

Very High Risk:

1. Haemodynamic instability:
   - Heart failure/ cardiogenic shock
   - Mechanical complications of myocardial infarction
2. Life-threatening arrhythmias or cardiac arrest
3. **Recurrent** or **ongoing** ischaemia, i.e chest pain refractory to medical treatment) or **recurrent** dynamic ST segment and/or T wave changes, particularly with:
   - Intermittent ST segment elevation
   - de Winter T wave changes

- Wellens syndrome (or LMCA syndrome)
- Widespread ST elevation in two coronary territories.

High Risk:

1. Rise and/or fall in troponin level consistent with MI
2. Dynamic episode of ST segment and/or T wave changes with or without symptoms
3. GRACE score >140

Intermediate Risk:

1. Diabetes mellitus
2. Renal insufficiency (glomerular filtration rate < 60mL/min/1.73m^2)
3. Left ventricular ejection fraction $\leq$ 40 %
4. Prior revascularization:
   - Percutaneous coronary intervention
   - Coronary artery bypass grafting
5. GRACE score >109 and <140

GRACE = Global Registry of Acute Coronary Events

See: http://www.mdcalc.com/

Low Risk:

Patients with NSTEACS who have:

- No recurrent symptoms

And

- No risk criteria (as listed above)

are considered at **low risk** of ischaemic events.

Management

Important initial management in the ED includes:

1. Control of pain:

    - Give nitrates/ morphine as required.

2. Aspirin:

    - 300mg orally.

3. **Ticagrelor,** loading dose, **180 mg**.

    - Careful assessment of bleeding risk should be undertaken before using these agents.

    - Avoid if emergency coronary artery bypass grafting is likely

4. Anticoagulation therapy:

    - This should be with an initial **5,000 unit heparin bolus**. (Rather than with subcutaneous fractionated heparins (enoxaparin) in order to reduce the potential for bleeding complications during PCI).

    - Note that if enxoparin has already been given PCI is not absolutely contraindicated.

    - Although not ideal, it should be noted that prior thrombolysis does not exclude a PCI.

5. Glycoprotein IIb/IIIa inhibitor therapy:

    A glycoprotein IIb/IIIa agent, is also recommended in patients who are to receive urgent PCI.

    Current options include:

    - Integrilin, (eptifibatide)

    - Reopro, (Abciximab)

    - Aggrastat, (Tirofiban).

6. Bivalirudin:

    Bivalirudin is a direct thrombin inhibitor.

    Amongst patients with STEMI undergoing primary PCI, the use of bivalirudin can be considered as an **alternative** to heparin and GP IIb/IIIa inhibitors.

Assessment of Bleeding Risk:

The routine use of a validated risk stratification tool for bleeding events may also assist in individual patient clinical decision making in regards to ACS care.

The **CRUSADE Score** may be used in this regard.

It risk stratifies patients for bleeding complications according to 8 parameters:

- Heart Rate
- Systolic Blood Pressure
- Hematocrit
- Creatinine Clearance
- Sex
- Signs of CHF at Presentation
- History of Vascular Disease
- History of Diabetes Mellitus

The score can be calculated via:

- http://www.mdcalc.com

Disposition

Following PCI all patients should then be admitted to CCU or ICU

Occasionally complications may arise during PCI, which necessitate a transfer to a facility with cardiothoracic surgical cover.

References

1. **Acute Coronary Syndrome Guidelines:**

   D.P Chew, I.A Scott, L. Cullen et al. National Heart Foundation of Australia & Cardiac Society of Australia and New Zealand: Australian Clinical Guidelines for the Management of Acute Coronary Syndromes 2016. Heart, Lung and Circulation (2016) 25, 895-951.

2. Guideline summary:

   D.P Chew, I.A Scott, L. Cullen et al. National Heart Foundation of Australia & Cardiac Society of Australia and New Zealand: Australian Clinical Guidelines for the Management of Acute Coronary Syndromes 2016. MJA 205 (3) 1 August 2016.

   - doi: 10.5694/mja16.00368 j

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