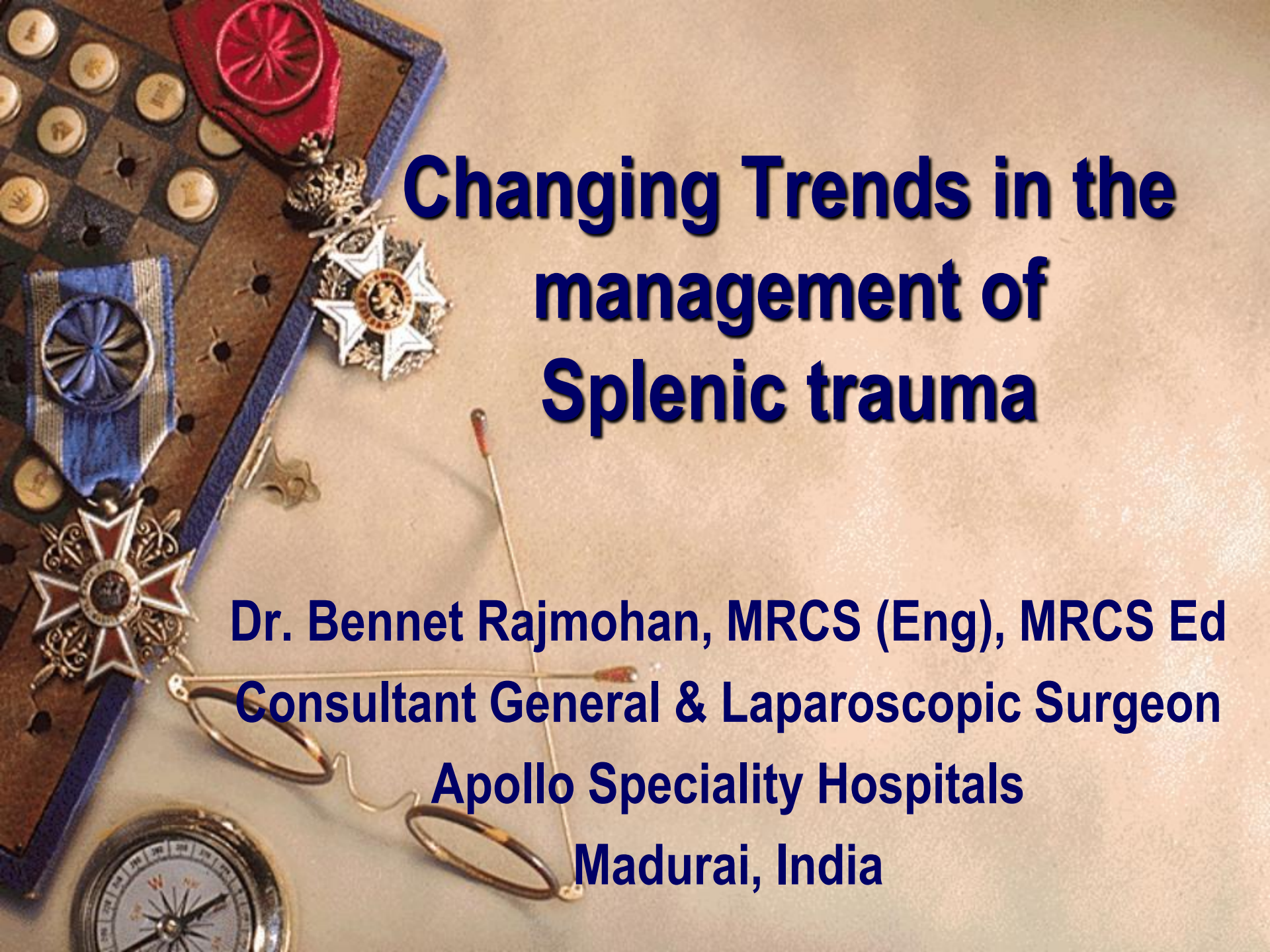

Changing Trends in the management of Splenic trauma

Dr. Bennet Rajmohan, MRCS (Eng), MRCS Ed
Consultant General & Laparoscopic Surgeon
Apollo Speciality Hospitals
Madurai, India

Introduction

- Rip van Winkle
- Dramatic changes in management of abdominal solid organ injury

Functions of spleen

- Cellular functions (peripheral red pulp)
  - Haematopoiesis, storage, pitting, culling
- Immunological functions (central white pulp)
  - Antibody synthesis (esp, IgM)
  - Production of lymphocytes
  - Production of tuftsin, opsonins, properdin & interferon

Mechanism of injury

- 3 time intervals: Early, middle & latter parts of last century
- Early 20th century – spontaneous (Malaria, typhoid, mononucleosis), industrial & farm injuries, falls
- Mid 20th century – stab injuries, gunshots
- Late 20th century – blunt trauma, motor vehicle accidents

Diagnostic Eras

1) Operation or autopsy

2) Primitive diagnostic efforts

3) Diagnostic peritoneal lavage (DPL)

4) Focused imaging techniques

1. Operation or autopsy

- No investigations
- Indications for laparotomy
  - Tenderness & shock
  - Ballance's sign – dullness to percussion or shifting dullness in left upper quadrant
  - Kehr's sign – pain referred to left supraclavicular region

Operation or autopsy (contd)

- Autopsy studies
  - Non-operative therapy uniformly fatal
  - 100% mortality vs 50% for patients who had laparotomy
- Lack of precise diagnostic studies
  - Difficult to accurately determine incidence of either liver or spleen injury or their actual mortality rates

2. Primitive diagnostic efforts

- To confirm solid organ injury by X-rays or to confirm haemoperitoneum by needle puncture
- Obliteration of splenic shadow, indentation of gastric bubble, reflex distention of stomach & tenting of left diaphragm
- Paracentesis or four-quadrant tap – blood in peritoneal cavity → laparotomy

3. Diagnostic peritoneal lavage

- Diagnostic method of choice for detection of haemoperitoneum for over 30 years
- Highly sensitive for blood in peritoneal cavity (20ml)
- DPL – greatly diminished incidence of missed solid organ injuries, in the era before CT scanning

DPL (contd)

- In some patients, bleeding had either stopped or injuries were so inconsequential → Non-therapeutic laparotomy
- Impact of DPL cannot be underestimated
  - Less missed solid organ injuries but more non-therapeutic laparotomies
- Better diagnosis & inclusion of less severely injured patients → reduced mortality rates

4. Focused imaging techniques

Abdominal ultrasound

- High sensitivity for detecting blood in peritoneal cavity
- Advantages – haemodynamicaly unstable patients, portable & a part of physical examination (FAST)
- Disadvantages – Cannot predict source of blood & cannot grade organ injuries

Imaging (contd)

- CT scanning – gold standard for diagnosis of solid organ injury
- Allows reasonably accurate grading of organ injuries & provides crude quantitation of degree of haemoperitoneum
- Excludes visceral injuries with an acceptable degree of accuracy

Imaging (contd)

- CT scan – mandatory for non-operative management of blunt injury abdomen
- Also useful for detecting missile tracts in penetrating trauma → Such information must for surgeons attempting non-operative management of penetrating wounds
- Haemodynamically stable patient necessary

Grades of Splenic Injury

- **Grade I** – haematoma < 10%, laceration < 1cm
- **Grade II** – subcapsular haematoma 10 – 50%, Parenchymal haematoma < 2cm dia, laceration 1 –3 cm
- **Grade III** – subcapsular haematoma > 50%, parenchymal haematoma > 2cm dia, laceration >3 cm

Grades (contd)

- Grade IV – ruptured intraparenchymal haematoma with active bleed, segmental or hilar vessel injury with >25% splenic volume devascularisation
- Grade V – Shattered spleen, devascularised spleen

Eras in management of splenic injury

2 eras:

- **Era of splenectomy** (for virtually all splenic injuries) &

- **Era of splenic preservation**
  - Splenic salvage operations
  - Embolisation of splenic artery or branches
  - Non-operative management

Splenectomy

- To avoid major morbidity or death from haemorrhage
- At least 1% to 2% of patients → Major delayed haemorrhage
- Splenectomy for treatment of potentially fatal bleeding from isolated splenic injury → remarkable results → < 1% mortality for over 50 yrs

Postsplenectomy infection

- 1952, King & Shumacker
- 1973, Singer, mortality in children – 0.58% & total death rate – 0.01%
- Mortality risk up to 50%
- Recent data – Incidence:0.9% of adults & 4.4% of children < 16 yrs
- < 70 cases worldwide, with a death rate of about 30%

OPSI - ? significant

- OPSI data from infants undergoing splenectomy for haematologic disorders
- Extension to children or adults undergoing splenectomy for trauma - ?

- OPSI more in 1) haematologic disease or immunosuppression 2) < 2 yrs age – immature immune system

Shift of emphasis

- From haemorrhage to Infection (OPSI)
- 3 reasons

1. Fear of OPSI, with rapid downhill course & 30 – 50% mortality

2. DPL-led increased negative laparotomies

3. Paediatric surgeons' experience at splenic salvage & then, non-operative management

Splenic salvage operations

- 1980s, Led by paediatric surgeons
- Splenic autotransplantation – not effective
- Splenorrhaphy in children & then in adults
  - Sutures, wrapping in omentum / mesh
  - 1.5 to 2% rebleed risk & higher blood transfusion need

Splenic salvage (contd)

- Splenic salvage operations declining with increasing non-operative management
- Still useful, when operation required, especially in children
- However, most non-operative failures → splenectomy

Splenic artery embolization

- Indications
- CT findings – significant haemoperitoneum, contrast extravasation, splenic artery pseudoaneurysm & AV fistula
- Failure rate – 13.5%
- Complications (20%)
    - Recurrent haemorrhage (13%)
    - Other missed injuries (3%)
    - Splenic abscess (4%)

Splenic artery embolization

- May avoid laparotomy, BUT
- Risk of rebleed – vessel spasm at time of initial angiogram
- Splenic infarction / abscess
- Effect on preservation of immunologic function not known

Non-operative management (NOM)

- Initially in children, then adults
- Laparotomy for unstable patients, higher-grade injuries or those with a vascular blush
- Criteria for NOM
  1) Haemodynamically stable patients &
  2) Lack of evidence of visceral injuries

NOM “failure”

- NOM failure – 12%
- Up to 30% in over 55yrs
- Most failures within first 4 days, but can happen even after a month

- Failures not a gradual decline in haemoglobin but rather catastrophic bleeding – delayed rupture

Mortality

- 6% to 7% or higher, due to associated injuries
- Mortality for isolated splenic injuries –
  < 1% for more than 50 yrs
- Mortality with NOM failure after discharge, MODS in polytrauma patient on NOM for splenic injury etc – difficult to assess

Current standard of care

- For a haemodynamically stable patient with splenic injury,
- documented by CT scan
- is non-operative treatment with close monitoring by an experienced surgical team
- in a hospital with 24hr access to emergency OT / blood bank facilities

However…

- NOM should not be the only goal to be achieved (NOM “failure”?)
- Splenectomy is **STILL** indicated as a **life-saving operation** in
  - Unstable patients
  - Most grade IV & all grade V injuries
  - Failure of NOM or embolisation (& complications)

Prevention of OPSI

- Avoid splenectomy, if possible
- Vaccinations against Pneumococcus, H. influenza B & Meningococcus
- Pneumovac only 70% protective even in immunocompetent
- Early suspicion & broad spectrum antibiotics
- Daily oral penicillin prophylaxis at least for 2 yrs post-op, esp in children <5yrs


Thank you