

MED 542 B Lecture 2: Anaesthesia and the Operation

The historical and procedural evolution of the surgical journey.

The Paradigm Shift:
From Agonizing Speed to Careful Control

¶ 2.1



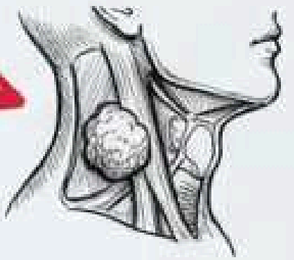
$C_4H_{10}O$ (Diethyl Ether)
$CHCl_3$ (Chloroform)

16 October 1846

Massachusetts General Hospital, Boston

Dentist William Morton

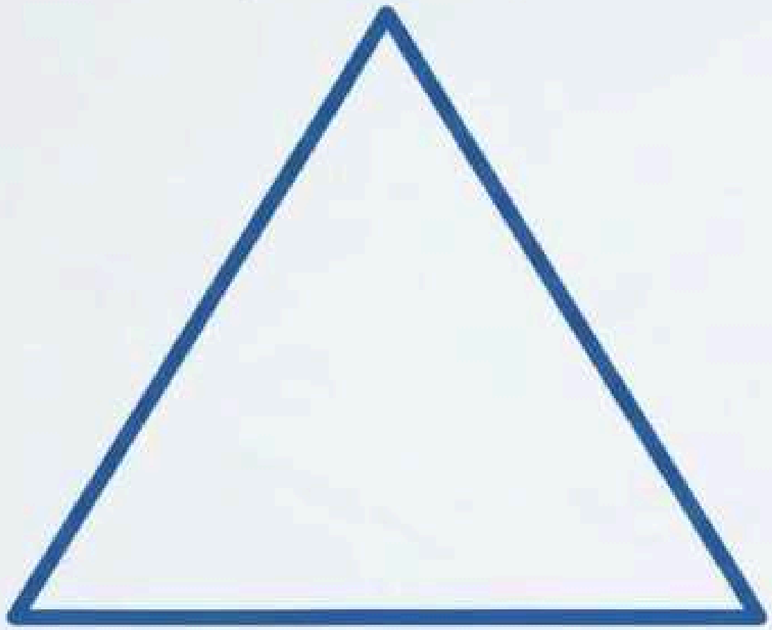
Tumour removal from patient's neck



Followed in 1847.

The Mechanism and Maintenance of General Anaesthesia

¶ 2.2



Step 1: Induction

Drugs injected into a vein

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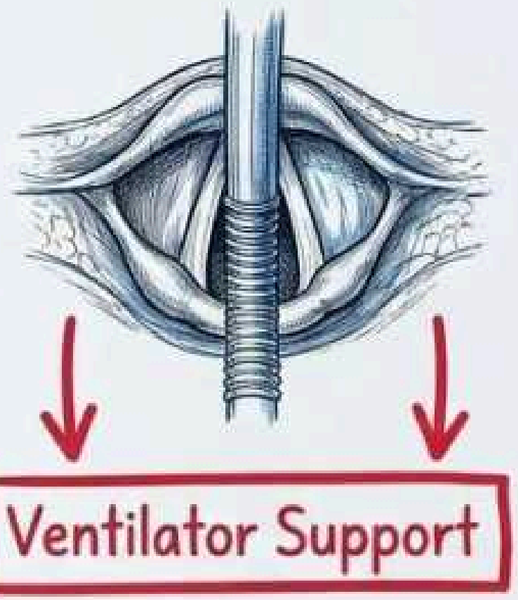
Step 2: Maintenance

Inhaled gases or continuous infusion

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Step 3: Protection

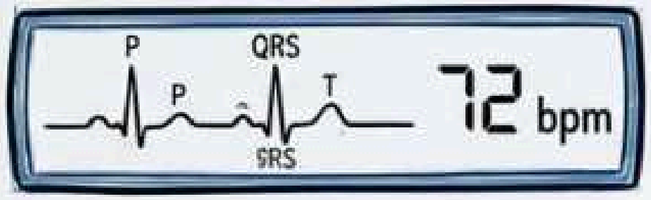
Suppressed breathing reflexes demand airway support



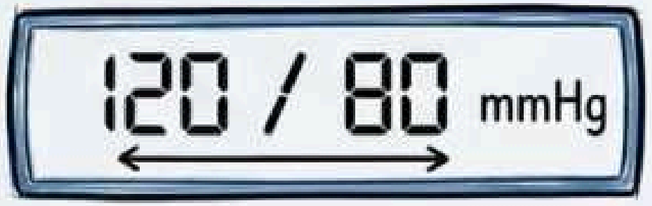
The 1980s Safety Revolution: Continuous Monitoring

¶ 2.3

Heart Rhythm (ECG trace)



Blood Pressure



Oxygen Saturation (SpO_2)



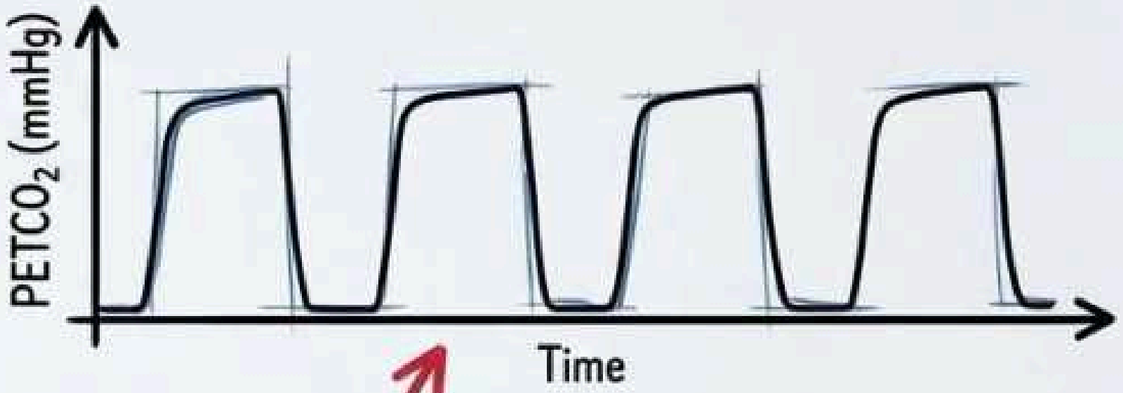
Anaesthetic Gas Concentration

Sevoflurane	2.1%	2.1%
N_2O	50%	4.2%

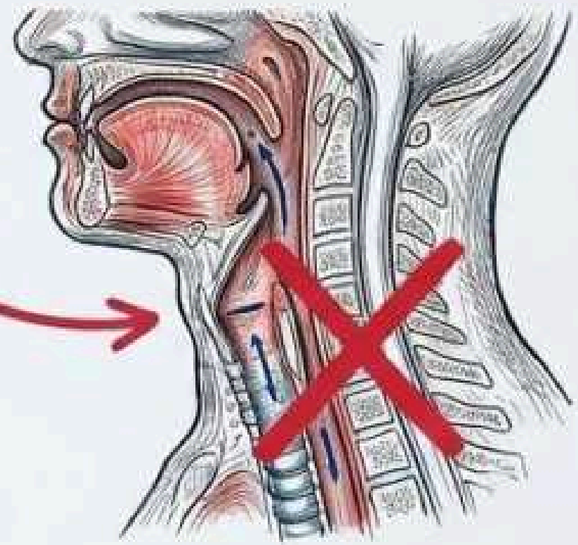
Carbon Dioxide ($PETCO_2$)



The Capnography Breakthrough



The 1980s introduction of Pulse Oximetry and Capnography revolutionzed safety. Capnography reliably detects a breathing tube misplaced in the oesophagus.



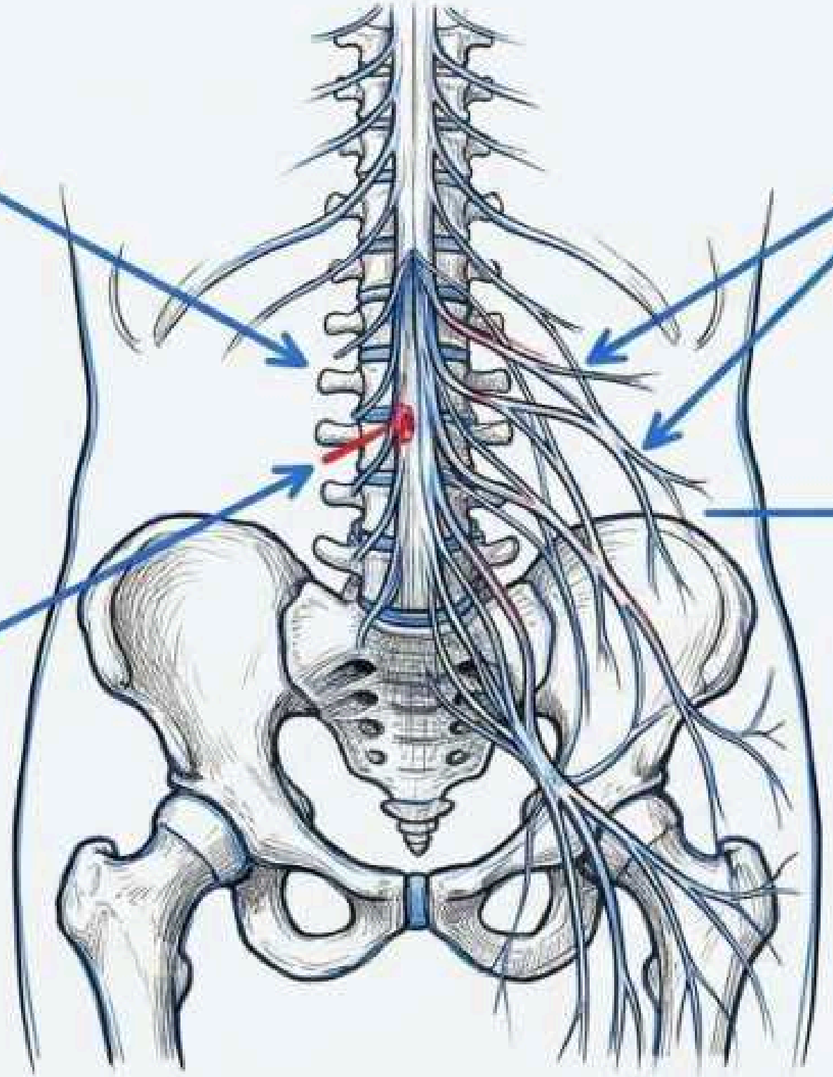
Anatomical Mapping of Regional Anaesthesia

Spinal Anaesthesia

Numbs lower body.
Used for caesarean sections, hip, and knee surgery.

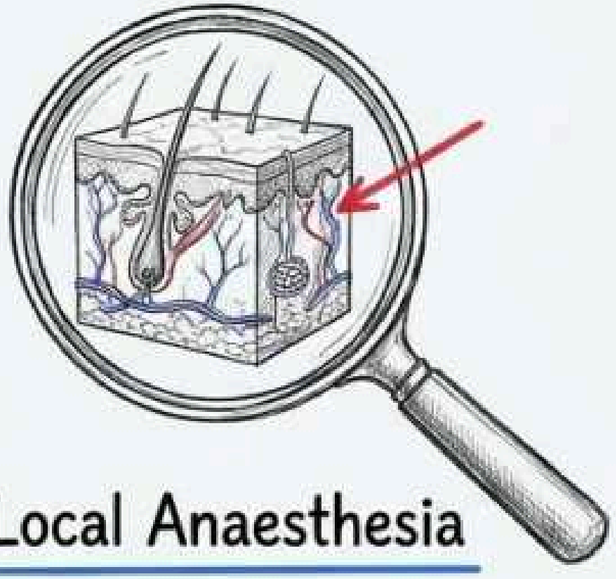
Epidurals

Provides continuous pain relief (e.g., in labour).



Nerve Blocks

Numbs a single limb.



Local Anaesthesia

Numbs a small area for minor procedures.

Stratification of Anaesthetic Risks

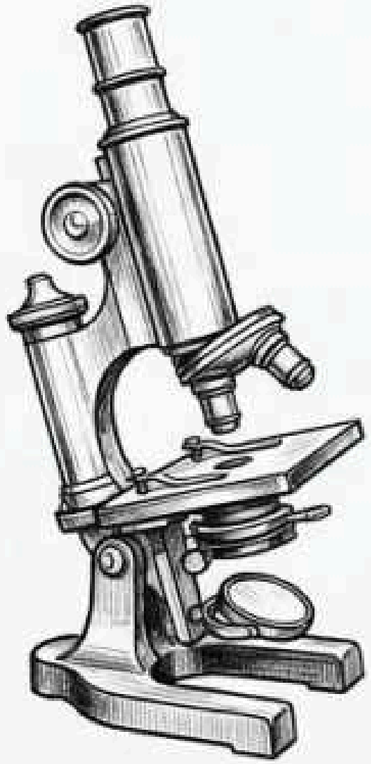
Baseline: Anaesthesia is now very safe for healthy patients; direct deaths are rare.

	Mild/Manageable	Severe/Dangerous
Common/ Expected	Nausea and vomiting, sore throat, dental damage	Allergic reactions, awareness during anaesthesia
Rare/ Specific	Confusion after surgery (Older patients)	Malignant Hyperthermia 

Malignant Hyperthermia:
A rare inherited condition causing a dangerous reaction to some anaesthetic drugs.
Requires a specific antidote.

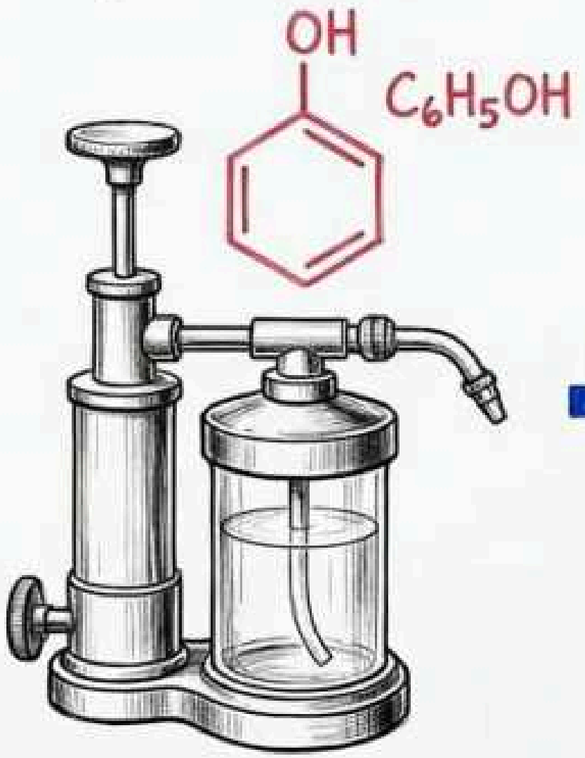
The Genesis of Asepsis and Surgical Principles

Louis Pasteur



Establishes Germ Theory.

Joseph Lister (1860s)



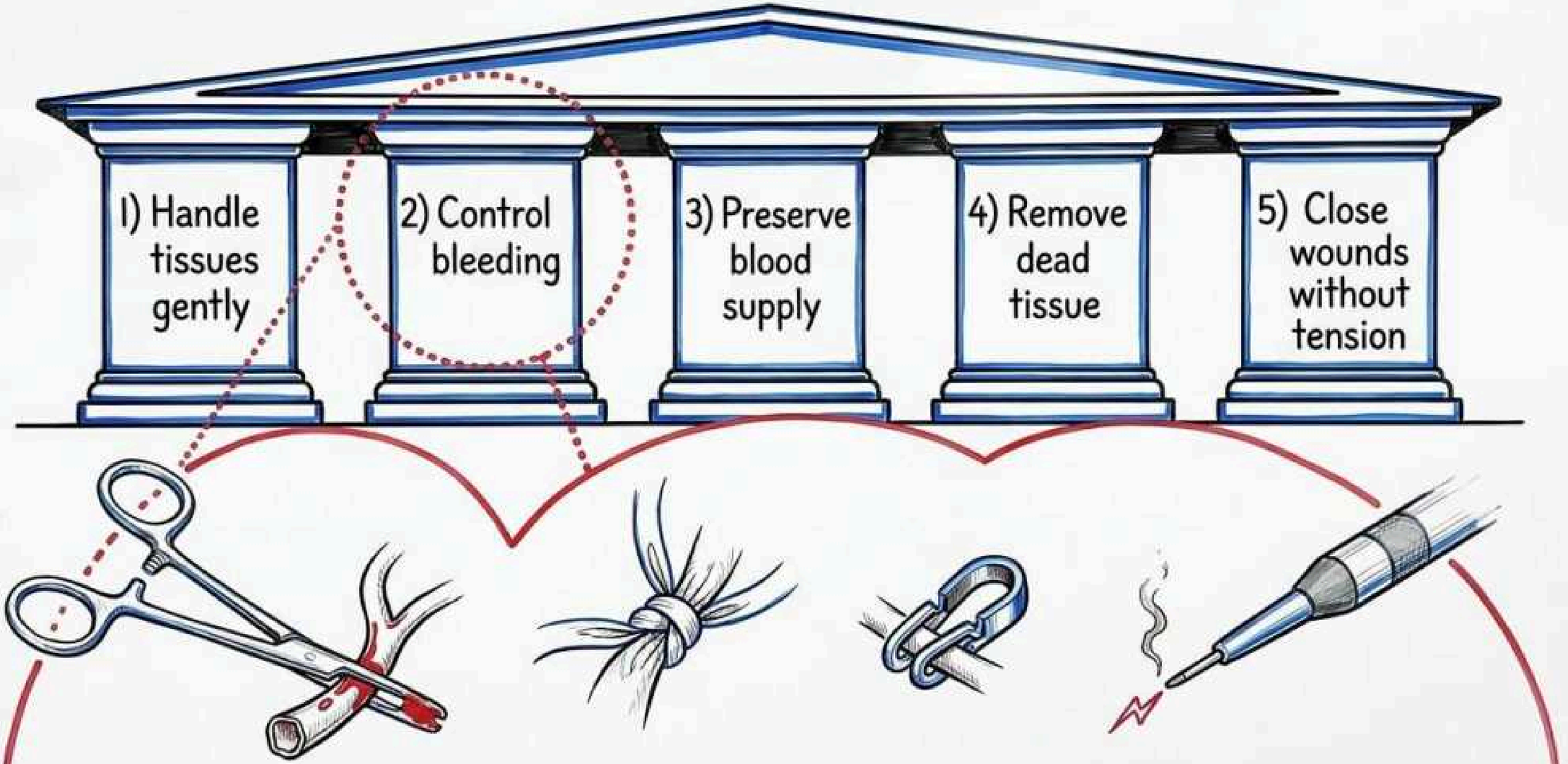
Introduces antiseptic surgery using carbolic acid to kill germs, drastically reducing wound infection deaths.

Modern Era



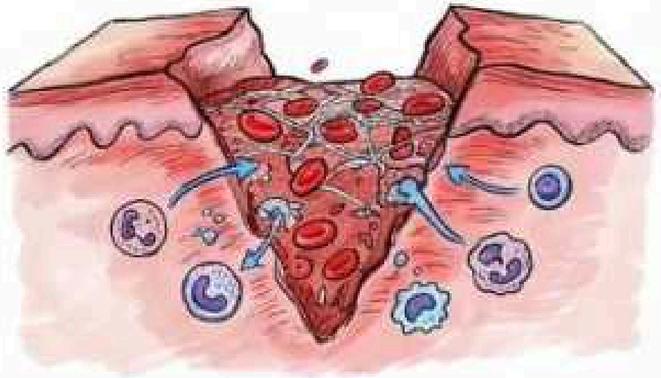
Aseptic technique: keeping instruments and the entire surgical field sterile.

Foundational Principles of Surgical Technique

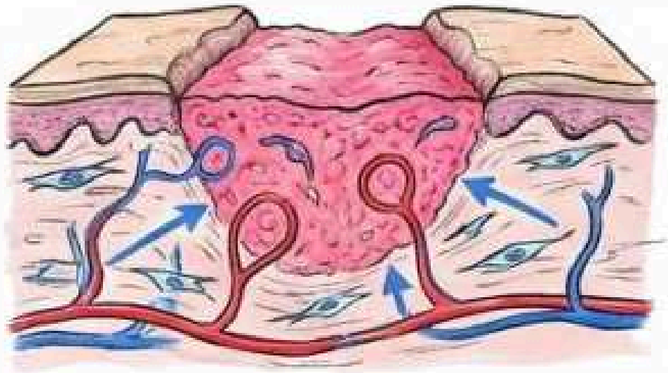


Wound Healing Phases and Intention

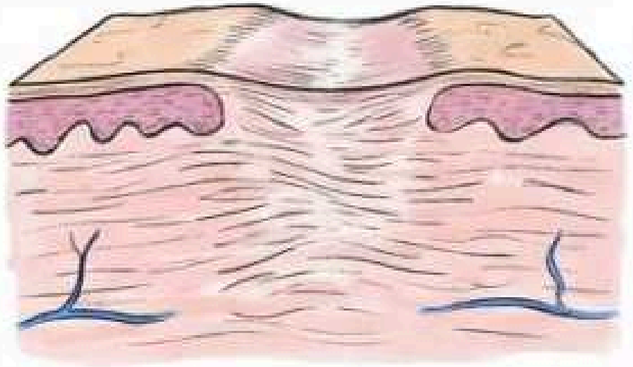
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Phase 1: Clotting and inflammation

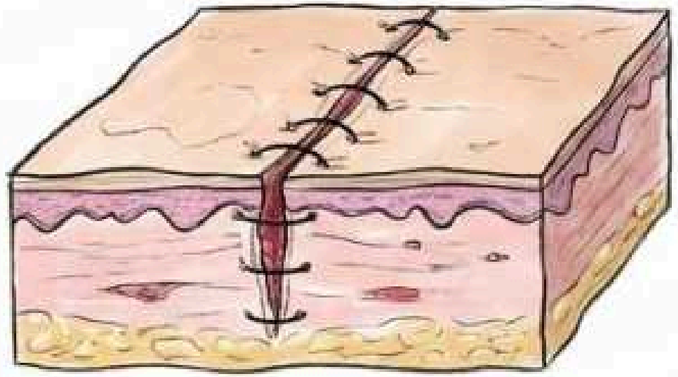


Phase 2: Formation of new tissue and blood vessels (Angiogenesis)



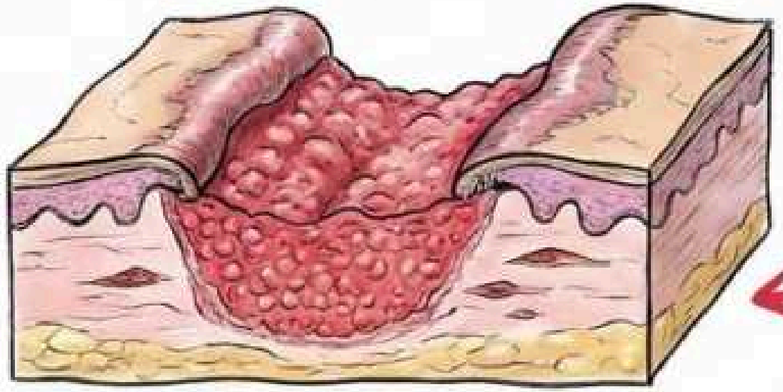
Phase 3: Remodelling of the scar (spanning months)

Primary Intention



Stitched closure.
Heals faster, less scarring.

Secondary Intention

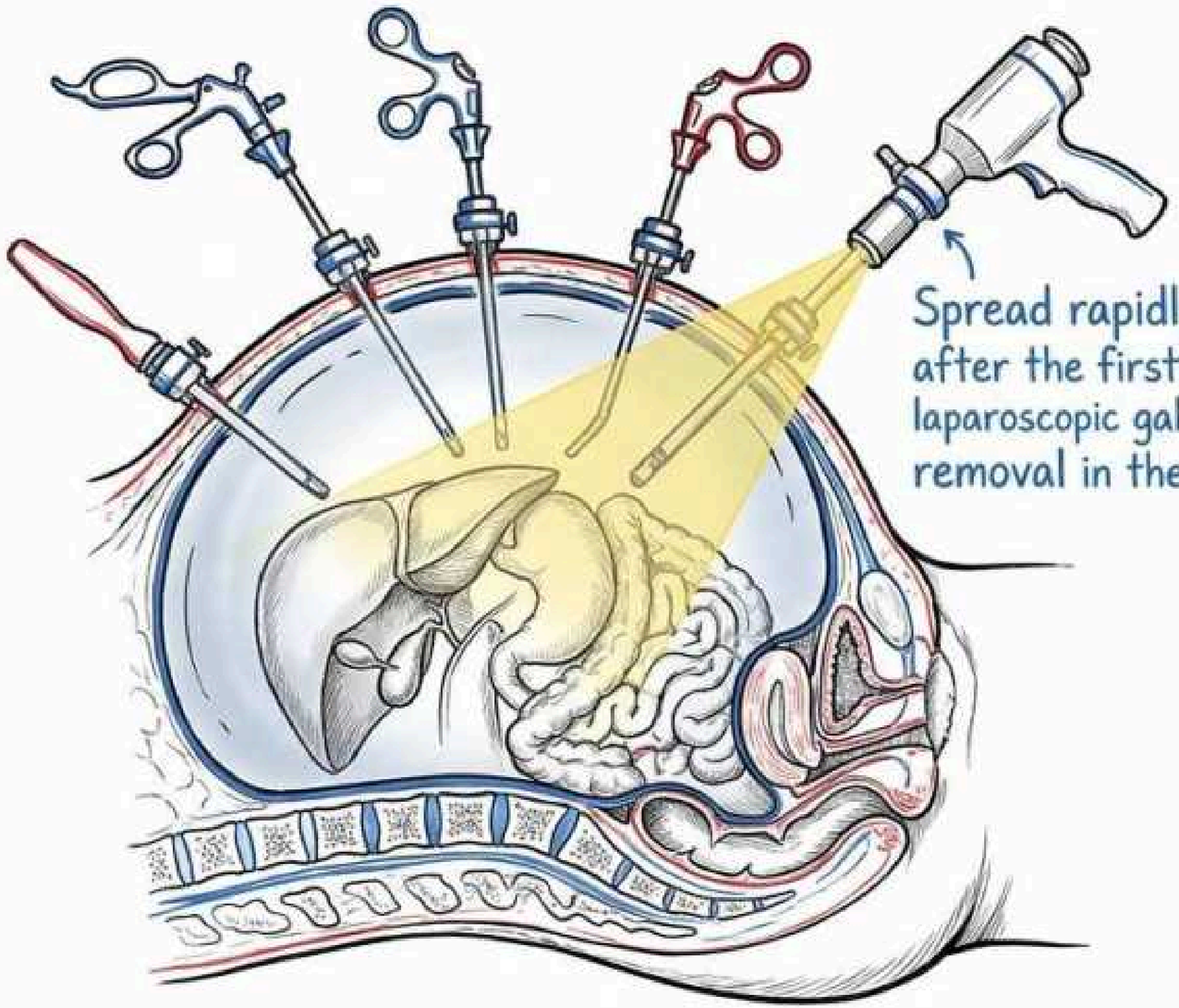


Left open.
Heals from the bottom up.

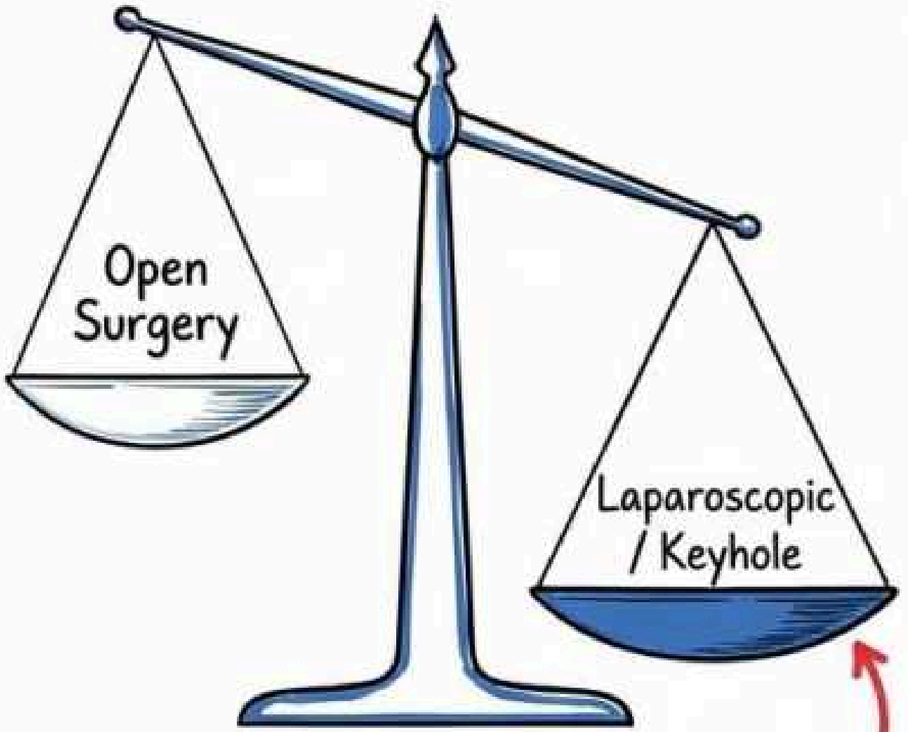
Caution

Smoking
Diabetes
Poor Nutrition
Steroids
Infection

Minimally Invasive (Laparoscopic) Surgery

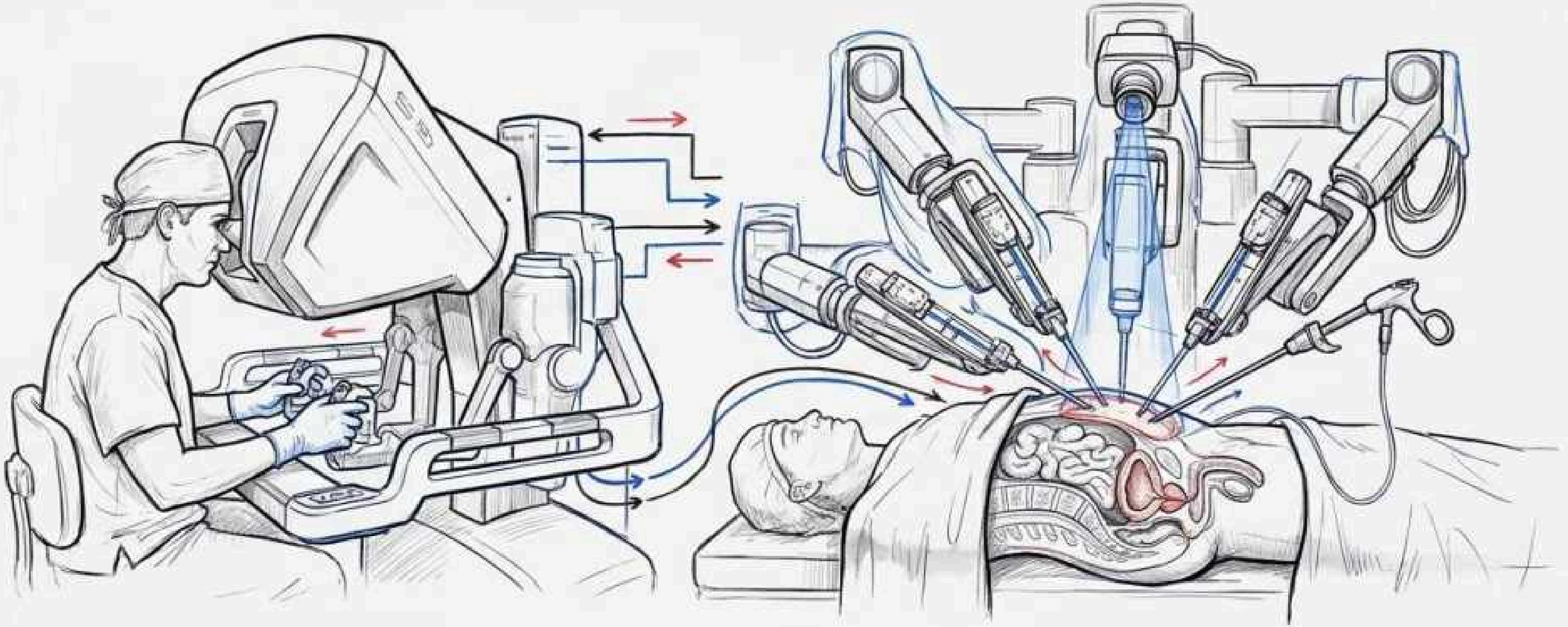


Spread rapidly after the first laparoscopic gallbladder removal in the 1980s.



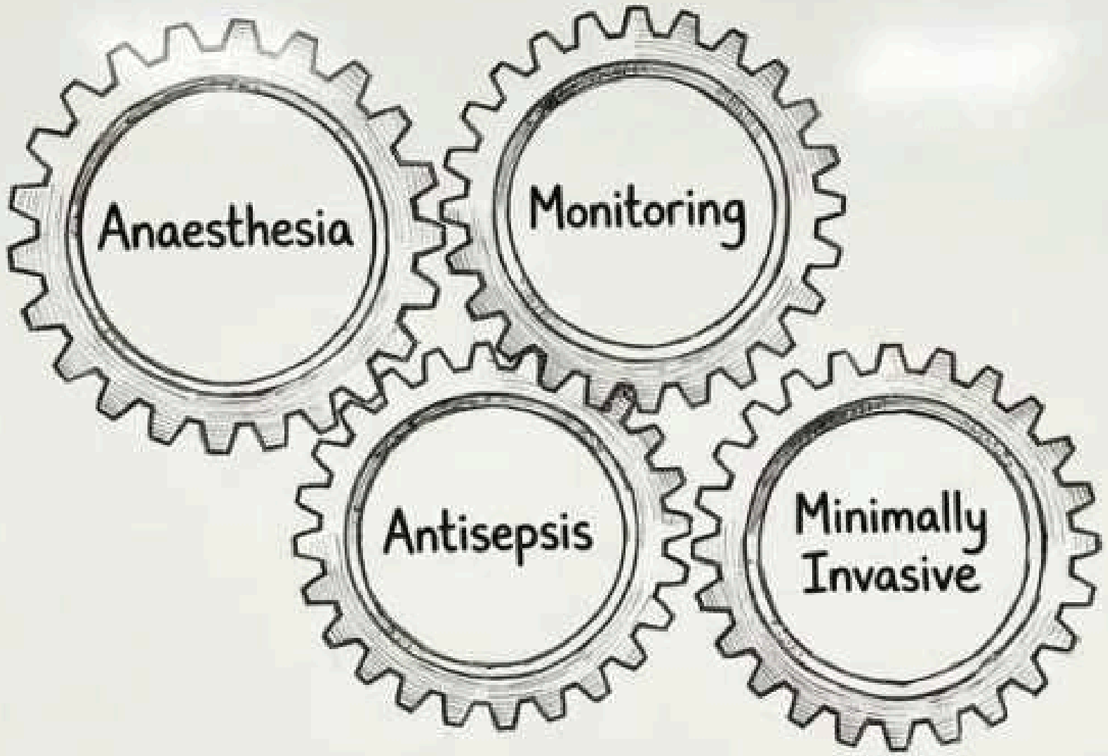
Less pain, smaller scars, faster recovery.

Robotic Surgery



Capabilities	Applications & Constraints
- Surgeon-controlled console - Precise movement - Three-dimensional vision	- Widely used in prostate and pelvic operations. - Advantages over standard laparoscopic vary by specific operation. - Significantly more expensive.

The Surgical Synthesis



(Anaesthesia → Possibility) + (Monitoring → Safety) + (Antisepsis & Technique → Reduced Infection/ Complications) + (Minimally Invasive → Rapid Recovery) = MODERN SURGERY

NEXT: The commonest surgical emergency — The Acute Abdomen.