The Historical Evolution of Endoscopy

Presented by: Sarah Ellison
What is Endoscopy?

- Minimally Invasive Philosophy
- Traditional Open vs Minimally Invasive Surgery
Visibility and Accessibility

- Lenses and Optics
- Illumination
- Cameras
- Orifices
- Trocar
- Insufflation
- Tubing
Lenses and Optics: Early

- 2640 BCE
- 1200 BCE
- 1300 BCE
- 1400 BCE
- 1500 BCE
- 1600 BCE
- 1700 BCE
- 1800 BCE
- 1900 BCE
- 2000 CE
- 2010 CE
- Future

- 1683 Antony van Leeuwenhoek
- 1805 Phillip Bozzini
- 1843 Antonin Jean Desormeaux
- 1865 Francis Cruise
- 1877 Maximilian Carl - Friedrich Nitze
- 1877 Maximilian Carl - Friedrich Nitze
- 1877 Maximilian Carl - Friedrich Nitze
- 1877 Maximilian Carl - Friedrich Nitze
Lenses and Optics: Modern

1908 Ringleb – Fl
1929 Heinz Kalk – 132º diagonal view
1934 John Roddock – "Foreblique visual system"
1967 Harold Hopkins – Quartz rod lens; 1970 – Fiber optics

Object in the scene
**Illumination: Early**

- **1550 BCE Papyrus Ebers** – Sunlight
- **912-1013 CE Abulkasim** – Candle light
- **1400 Arnold de Villanueva** – Candle light
- **~1520 Giulio Cesare Arranzi** – Candle light
- **1600 Pierre Borel** – Concave mirror
Illumination: Early Cont.

- 1729 Archibald Cleland – “Biconvex lens”
- 1805 Philip Bozzini – Candle light, mirror, transmitting lens, reflective tube
- 1824 John Fisher – Heated galvanized wire
- 1853 Antonin Jean Desormeaux – “Gasogene”
Illumination: Modern

- 1866 Julius Bruck – Water-cooled interior bulb
- 1873 Gustave Trouve – “Thin platinum filaments”
- 1874 Theodor Sigmund Stein – “Gas magnesium light”
- 1888 Maximilian Carl-Friedrich Nitezew
Illumination: Modern Cont.

- 1908 Otto Ringleb – Tungsten and osmium bulb
- 1952 Raoul Palmer – “Quartz rod lighting”
- 1960 Dr. Karl Storz – Fiber optics for lighting
- 1970 Corning – “Low loss optical fiber”
Cameras: Early

- 2674 BCE Nei-ching – “C
- 470-391 BCE Mot-tzu –
- 1858 John Czemak – “S
- 1874 German Theodor S endocamera”
Cameras: Modern

- 1938 Hoff and Neelf – “Mirror reflex camera” with color film
- 1953 Melvin Cohen and Guteman – “Cameron cavicamera”
- 1955 Raoul Palmer – Live color video
- 1955 Soulas and Debois – Live televised procedure
Cameras: Modern Cont.

- 1962 Dr. George Berci – Miniature camera
- 1970 Camran Nezhat – “Operating off the monitor”
- 1989 William Chang – 3-chip camera
Orifices: Early

+ 2640 BCE Edwin Smith Papyrus – Nasal cavity
+ 500 BCE Ayurveda of Susruta – Rectum and vaginal cavity
+ 400 BCE Hippocrates – Rectum
+ 912-1013 Abulkasim – Cervix
Orifices: Modern

- 1600 Arranzi – Nasal cavity
- 1729 Archibald Cleland – Nasal cavity
- 1805 Philip Bozzini – Rectum
- 1843 Antonin Jean Desormeaux - Rectum
- Modern – All orifices of interest inspected
Trocar: Early

- 25 BCE – 50 CE Aulus Celsus – “Leaden or copper cannula”
- 936-1013 Abulkasim – “Exploring needle with a groove”
- 1706 French word – “Trochartor troise-quarts”
- 1756 Domenico Masotti – Unclog-able trocar
Trocar: Modern

- 1901 Georg Kelling –
- 1987 USSC – Disposa
**Insufflation: Early**

+ 1493-1541 Paracelsus
+ 1882 Albert von Mosetig - Bellowed lungs

- 2640 BCE
- 2010 CE
Insufflation: Modern

+ 1901 Georg Kelling
+ 1901 Dimitry Otto
+ 1937 Janos Veress
+ 1947 Raoul Palmer
+ 1966 Dr. Kurt Semm
Tubing

- 1800 Pierre Salmon Segalas – Soft tip
- 1868 Adolf Kussmaul – Design of a sword-swallowing tool
- 1881 Mikulicz and Leiter – "Guiding mandarin"
- 1897 Georg Kelling – Finger flex design
- 1924 Dr. Rudolf Schindler – totally flexible, semi-flexible
Future

- Modern “da Vinci” robot – Dexterity
- Prototype virtual reality
Conclusion

Questions and Answers?
Acknowledgement

+ A great thank you to my advisor Dr. Toledo-Pereyra and to my committee members Dr. Barcelona and Larry Liu.
Citation


