

100 years since the introduction of the Kerr technique: The development of different surgical techniques used in caesarean sections throughout history

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Introduction

The caesarean section (CS) is an obstetric operation in which a baby is delivered from the mother through an abdominal and uterine incision.¹ CSs have a rich history having not always been an exclusively medical procedure yet evolving to become so. The aim of this project is to provide enhanced understanding of how surgical advancements in techniques and incisions have revolutionised CSs. As well as highlighting the role John Munro Kerr played in this development with the Kerr technique, which involves a curved transverse incision in the lower uterine segment. This technique became the favourable method of uterine incision in CSs and was widely adopted and disseminated.² The improvements in patient care, technological developments, and surgical conditions and techniques have paved the way for CSs to become the common and safe operation, both in emergent and elective scenarios, that it is today.³

Methodology

Archives and databases were explored to find journal articles written by key historical obstetricians. Journals and books were useful in providing information that was difficult to obtain and helped allow for a more comprehensive account.

Figure 1. M0013876: The birth of the Julius Caesar by caesarian section. Illustration from Suetonius: *De vita Caesarum*, Venice: J. Rubeus, 1506. Wellcome Collection. Attribution 4.0 International (CC BY 4.0)



Ancient and Medieval periods

In ancient and medieval times, the delivery of the child postmortem for separate burial, in many cultures, had profound religious significance with initially little medical usage.⁴ The Catholic Church enforced an order of mandatory postmortem CS due to the belief that the child's soul needed to be saved through baptism. It wasn't until later in the medieval period that the CS was used to save the child's life as a primary objective. The uterine incision of choice was the 'classical vertical incision' (*Figure 2.*), an incision made at the midline of the uterus after a vertical incision opens the abdominal wall.⁵ This incision is rarely used today however back then it provided direct, quick, and easy access to the uterus to save the child in emergent cases with little to no regard for maternal survival.⁶

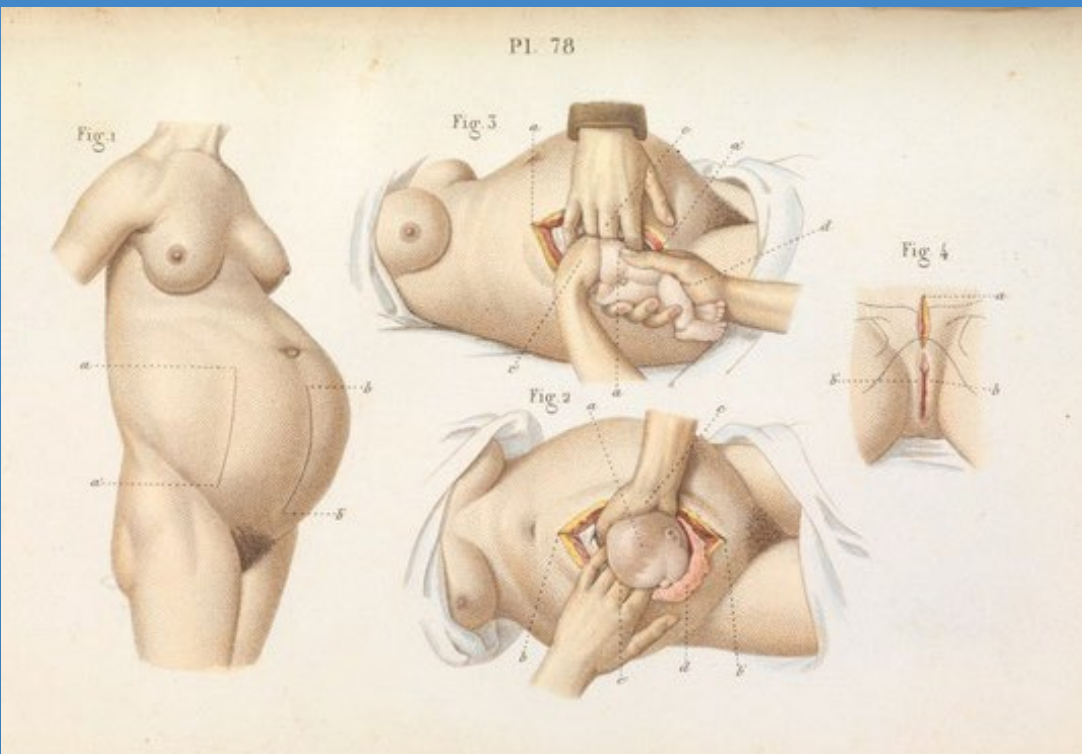


Figure 2. Plate 78, Surgical technique for caesarean section. Wellcome Collection. Public Domain Mark

Renaissance and Modern Periods

As time progressed, CSs evolved in reflection of the emerging awareness of maternal and foetal safety.⁷ It was during the 19th century that many advancements in caesarean surgical technique developed as well as rapid development of knowledge regarding antisepsis, antibiotics and anaesthesia.^{8,9} In 1879 the Ugandan Banyoro tribe was documented to have used banana wine as a form of anaesthesia and antisepsis as well as blunt dissection to open the uterus. These surgical techniques worked to provide a clean environment helping to minimise haemorrhage and promote wound healing.¹⁰ Different abdominal and uterine incisions developed to reduce intraoperative and postoperative complications: Eduardo Porro conducted hysterectomies post-CS. Max Sänger introduced the use of silver and silk sutures to close the uterus after a CS was performed. There was also a shift to transverse abdominal and uterine incisions which revolutionised the procedure. Overall maternal and foetal mortality rates for CSs showed a dramatic reduction from 75%-100% at the beginning of the 19th century to 10% by the beginning of the 20th century.¹¹

John Munro Kerr and the Kerr technique

John Munro Kerr (1868 – 1960) was a Scottish Professor of Obstetrics who developed the 'Kerr technique' which played a pivotal role in obstetric surgery. Throughout the Modern period, a common problem arose regarding uterine rupture in vaginal birth after CS (VBAC). Munro Kerr originally favoured the classical vertical incision but when training in Germany, he learned of Ferdinand Adolf Kehrer's suggestions of the low transverse uterine incision and began to believe this was the safest place of entry to the uterus.¹² He found this incision provided a smaller likelihood of haemorrhage, a lower incidence of adhesions, infections, and quicker healing of the uterus. In 1926, Munro Kerr reported on 107 cases of women undergoing the low transverse incision with 0 (0%) women experiencing uterine rupture in subsequent pregnancies. This contrasted to the classical vertical incision where 18 women out of 448 cases (4%) experienced uterine rupture.^{1,3,14} Munro Kerr further demonstrated that the low transverse uterine incision was the safest method of uterine incision, particularly in preventing future rupture. The Kerr technique has as a result developed into a widespread practice, widely recognised for its superiority.⁴

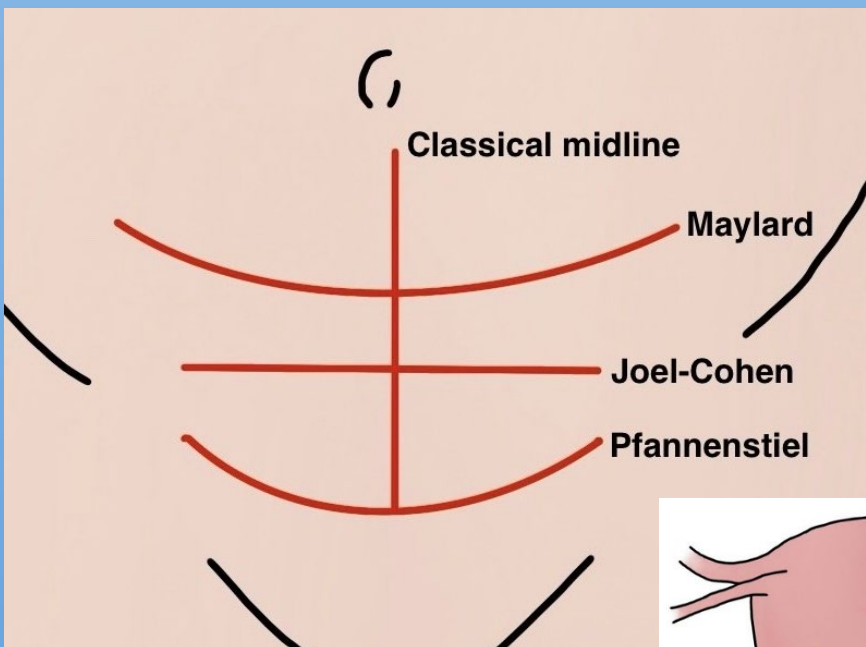
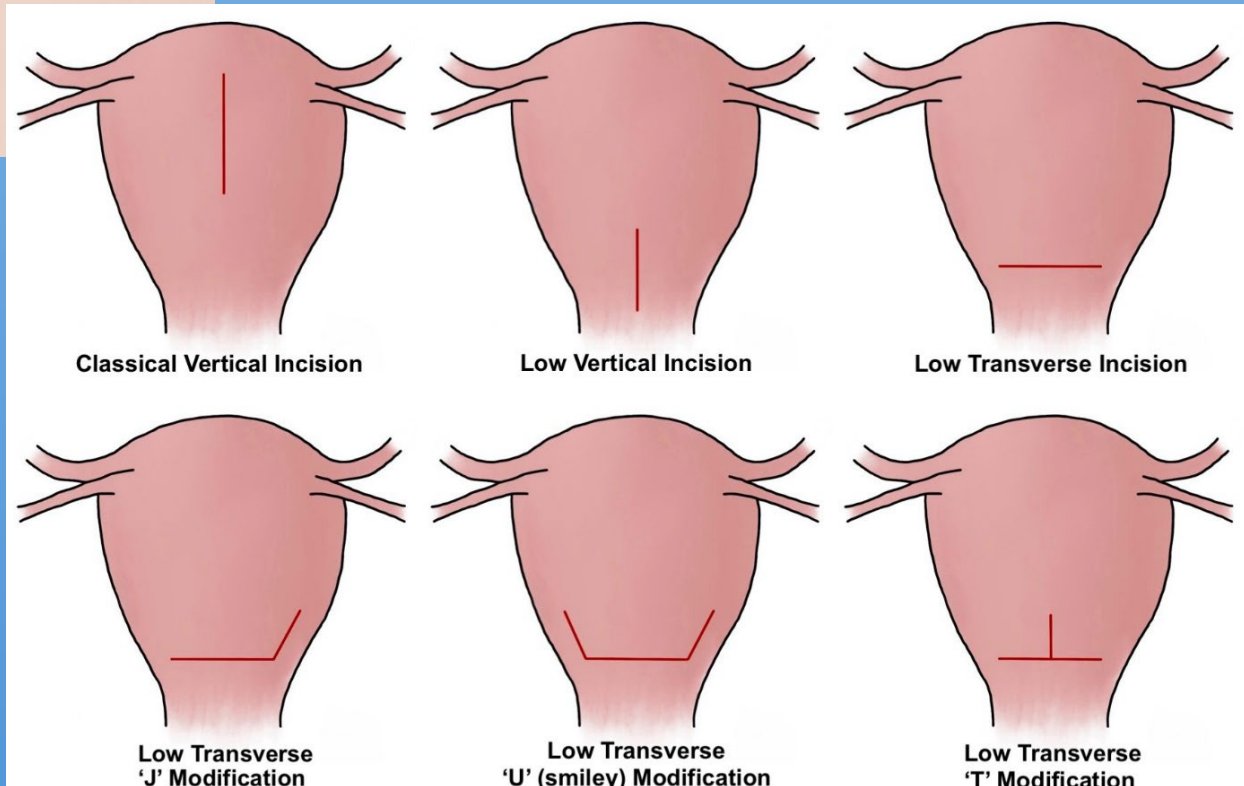


Figure 3. (Left) Abdominal incisions developed for CSs. Drawn and labelled digitally by author.

Figure 4. (Right) Uterine incisions and modifications developed for CSs. Drawn and labelled digitally by author.



Development post Kerr and in present day

Transverse abdominal incisions have majorly advanced in recent years (*Figure 3.*). The 1900 Pfannenstiel method, a curved transverse abdominal and fascial incision at the level of the pubic crease allowed for a more secure close and less pain postoperatively.^{3,15} The 1972 Joel-Cohen, straight transverse abdominal incision, reduced blood loss and operating time, likely due to its use of blunt dissection.^{4,16} With regards to uterine incisions, the Kerr technique has been modified to offer advantages of reduced blood loss, recovery times, and for instances where a larger incision and more space is required for delivery ('J' 'U' and 'T' shape modifications) (*Figure 4.*).¹⁸ In contrast to when CSs were first performed, improvements in patient care partnered with technological advancements have developed the CS to emerge as a relatively safe operation both in emergencies and specifically as elective procedures with a maternal mortality rate of less than 1%.¹⁹ Despite this, it has been highlighted that patient autonomy has meant that although the risk of uterine rupture is low in VBAC, elective CSs have still increasingly taken place.³ This implies there is still a way to medically optimise and address risk in VBAC after a low transverse uterine incision CS.

Conclusions

Historical information on different surgical techniques is essential to inform obstetricians today of the implications of each method and enables holistic CS decisions to be made. In conclusion, the development of surgical techniques and incisions has allowed the CS to evolve into the safe and important operation that it is today.

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