

# Eduardo Porro (1842 – 1902) and the Development of Caesarean Section: A Reappraisal

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## Abstract

Caesarean delivery has been practiced since antiquity but usually as a post-mortem procedure or for cultural or religious reasons. Until the advent of anaesthesia in the late 19th century the outcome was extremely poor for mother and child. A pivotal stage in the history of the Caesarean operation was the work of the Italian obstetrician Eduardo Porro (1842-1902) who advocated hysterectomy to reduce haemorrhage and prevent infection, but at the expense of the mother's future fertility. Porro's method resulted in major improvements in survival and ushered in the modern era of Caesarean section.

## INTRODUCTION

In the history of Caesarean section, the work of the Italian obstetrician Eduardo Porro represents a pivotal stage in the development of the procedure in the modern era. Porro advocated hysterectomy during a Caesarean to control uterine haemorrhage and prevent peritonitis. His procedure contributed to improved outcome for mother and child, but at the cost of the mother's future fertility. Prior to Porro, the mortality for both patients was virtually 100%. Within five years of his initial operation, 50 cases delivered by the Porro method showed a maternal mortality of 58% and an infant survival of 86%, a major advance for the time<sup>1</sup>. Porro's achievements are not widely acknowledged but they led to further refinements which ushered in the modern era of Caesarean section. His standing has been affected in part by the nature of the operation which involved the radical measure of hysterectomy. However, because of his revolutionary work and the developments which followed, Porro could be considered one of the founding fathers of the modern Caesarean operation.

The concept of Caesarean hysterectomy which was the basis of Porro's operation dates back to 1768 when Joseph Cavallini successfully excised the pregnant uteri in dogs and sheep. He concluded that the organ was "not necessary to sustain life" and speculated that in a future generation it might be possible to undertake in humans. "In speculative moments, I have sometimes felt inclined to persuade myself that the dangers of Caesarean operation might be considerably diminished by removal of the uterus. Perhaps

this method of operating may prove an eminent and valuable improvement"<sup>2</sup>.

The first Caesarean hysterectomy was performed in a woman by Horatio Storer in Boston in 1868<sup>3</sup>. Storer was a Harvard graduate who trained with James Young Simpson in Edinburgh. Abdominal delivery was necessary in this case because the birth canal was obstructed by a large pelvic tumour. The operation was undertaken as a three-hour emergency procedure after labour had commenced. Although the infant survived, the mother died on the third post-operative day because of the effects of haemorrhage. It was not until 1876 that Porro performed the first planned and successful operation.

## EDUARDO PORRO'S LIFE

Eduardo Porro was born in Padua on 17 September 1842, the son of an engineer. He entered the University of Pavia Medical School, one of the oldest in Europe, and graduated in 1866. Later he worked as a young doctor at L'Osedale Maggiore in Milan before his training was interrupted to serve in the military, fighting for Italian unification under Garibaldi. He returned to Milan in 1868 and studied obstetrics at the hospital of Santa Caterina and after three years was made director<sup>4</sup>.

Porro's academic standing was recognised in 1875 when he was appointed Professor of obstetrics at the University of Pavia. He remained there until 1882 before he assumed the Chair of obstetrics in Milan where he served the remainder of his professional life. As well as being a leading

obstetrician in Europe in the late nineteenth century, he was also involved in politics and liberal democracy and in 1891 was elected to the Italian Senate. Apart from his seminal study on Caesarean section, he published little in the remainder of his professional life. In 1902 he sustained an accidental hand wound while operating on an infected patient and died from the complications of sepsis in that same year.

### **PORRO'S FIRST OPERATION**

In 1876, Eduardo Porro reported the first Caesarean hysterectomy in which both infant and mother survived<sup>5</sup>. Storer's operation eight years earlier had been an emergency procedure with the decision to amputate the uterus as a last minute life saving measure to prevent haemorrhage. Porro's operation however was a carefully planned and executed undertaking in more optimal conditions. Although Storer later reported his case, it was largely unrecognised in his day. Porro on the other hand documented his operation in a publication the following year in a paper of 63 pages. It attracted widespread interest throughout the world and became known as Porro's operation.

Porro's paper describes the case in great detail. The mother was a 25-year-old primigravid dwarf Julia Cavillini who was referred to Porro's clinic in Pavia because of a suspected malformed pelvis. She had suffered from rickets between the ages of three and ten and during this period was unable to support herself in the erect position without assistance. She was 148 centimetres tall and had the characteristic bony features of rickets including bowlegs, scoliosis and the right iliac crest was four centimetres higher than the left. Porro also noted the pelvis was narrowed in all planes with a diagonal conjugate of seven centimetres. In addition spondylolisthesis of the lumbar spine resulted in a form of roof over the pelvic inlet. He wrote, "It was obvious that absolute disproportion existed and that caesarean section was mandatory."

Porro consulted with his colleagues in Pavia and all concurred that vaginal delivery was impossible even with embryotomy. He discussed the case with the Bishop of Pavia who consented on religious grounds to the procedure being performed. His plan was to amputate the uterus through an abdominal incision if he encountered serious haemorrhage during the delivery.

Julia Cavillini was admitted to hospital on May 21 prior to labour. Her membranes were ruptured and chloroform anaesthesia was administered. He records in his paper "at

4.51 pm we began to cut through the abdominal wall, layer by layer through a 12 centimetre incision in the linear alba. After the peritoneal cavity was opened, the uterus was immediately incised, in the same direction and to the same extent as the abdominal incision. Unable to deliver the foetal head with my right hand in the uterus, I finally reached up, grasped and delivered the right leg and thigh, the left leg, trunk, arms and head followed immediately. We extracted a large (3300 gram) female infant alive, healthy, well formed and crying spontaneously. After tying and dividing the umbilical cord we proceeded to extract the placenta, which we removed intact, together with the major portion of the membranes."

The uterus bled profusely from its cut edges and could not be controlled by a suture. Porro noted, "It was providential that we had made all the preparation necessary for hysterectomy; otherwise the patient would surely have died." The uterus was held up out of the abdominal wound and a wire snare of Cintrat at the level of the internal os was pulled up tightly and after blood flow was completely shut off, the uterus was excised above the ligature. He proceeded to peritoneal toilet using Lister's carbolized sponges, removed blood clots and then the uterine stump was incorporated into the lower part of the abdominal wound. The post-operative course was marked by a vulvovaginitis, sacral ulcers and suppuration of the abdominal wound as well as a urinary infection. The snare over the gangrenous portion of the uterine stump was removed on day four as was the vaginal drain. Both mother and infant survived and Porro's paper contains a plate of Julia Cavillini during her convalescence. (Figure 1) Soon after at the medical congress of Turin, Porro proclaimed, "I believe that the day is not far off in which medical science will pronounce its solemn verdict approving utero-ovarian amputation in every case of Caesarean section."

### **DEVELOPMENTS AFTER PORRO**

Porro's paper "Dell'amputazione utero-ovarica come complemento de taglio cesereo" attracted widespread interest throughout the obstetric community worldwide<sup>5</sup>. Not long after, Inzana and Previtali in Italy and Hegar in Germany presented case reports of caesarean hysterectomy. Numerous modifications of the technique were proposed but it quickly became known as Porro's operation. Muller in Switzerland advocated the removal of the uterus from the peritoneal cavity and elevation onto the abdominal wall before making the hysterectomy incision. By 1880 Robert Harris collected 50 cases of Caesarean hysterectomy

worldwide <sup>1</sup>. The maternal mortality was 58% and foetal mortality was 86%, which represented a major advance in survival from earlier attempts.

Richardson in the United States performed the first procedure in 1881. This was also undertaken on a young dwarf and he utilised Muller's technique of exteriorizing the uterus. The first successful Caesarean hysterectomy in Great Britain was undertaken by Godson and published in the *British Medical Journal* as 'Porro's Operation' in 1884<sup>6</sup>. Tait in Birmingham recommended exteriorization of the uterus and suture of the cervical stump to the abdominal wall <sup>2</sup>.

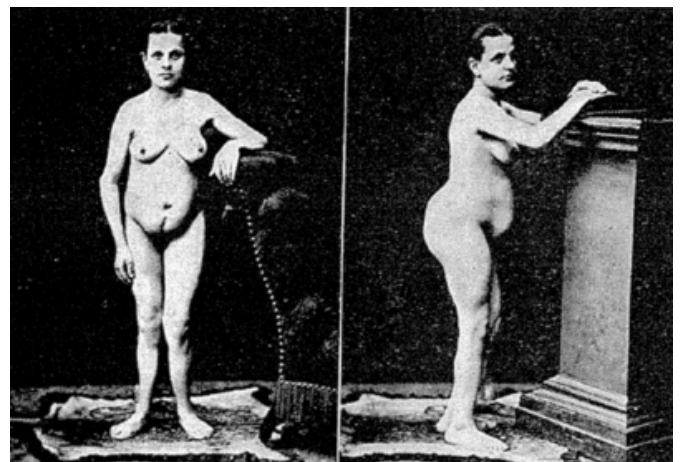
The Porro hysterectomy had only a short period of popularity as Max Säger drew attention to the importance of accurate uterine closure by deep and superficial sutures <sup>7</sup>. Säger's technique was a median incision of the uterus (the classical incision) and careful stitching of the wound with silver wire suture material. Major advances in the early twentieth century led to further reductions in maternal death from the operation. Murdoch Cameron in Glasgow championed Säger's technique whilst James Munro Kerr of Glasgow and Frank and Sellheim pioneered the lower segment transverse operation. Through the twentieth century improvements in patient care established the Caesarean section as a safe procedure as an emergency and elective operation. From the early twentieth century, blood transfusions had become more widely available whilst the use of sulphonamides (1935) and penicillin (1941) has substantially reduced poor outcomes from sepsis. Caesarean hysterectomy is still occasionally undertaken in modern obstetric practice. In the non-emergency setting, indications arise for cases of invasive cervical malignancy or uterine tumours. In emergency setting, uncontrolled haemorrhage due to coagulopathy or overwhelming infection may sometimes lead to this procedure <sup>8</sup>.

Caesarean section has undergone major transformation in the era of anaesthesia. The figure of Eduardo Porro stands at a pivotal point in this long history. Porro's academic background in obstetrics and careful clinical method utilising the principles of Lister resulted in the first successful outcome for mother and infant in the early modern era. At the time it attracted widespread interest with many leading obstetricians throughout the world undertaking his operation and modifying the methodologies. With improved surgical techniques and medical and nursing care, caesarean section is now regarded as a safe and effective procedure.

The achievements of Eduardo Porro are not widely recognised. In the historical development of Caesarean section the work of other leading figures such as Säger, Tait and Kerr is more often cited. Porro's reputation may have suffered in part because of the extreme nature of his procedure which involved hysterectomy with loss of the mother's future fertility. This is overshadowed by the demonstration that it was a life-saving procedure capable of delivery of a living infant. Also although enthusiastically taken up at the time, it was largely superseded by the 1890's and Porro himself made few other contributions to obstetric practice. Nonetheless it is clear that his operation was based on scientific study and carefully planned in discussion with his peers and religious authorities. Whilst many obstetricians in the late 19th and early 20th century made important contributions and modifications, the operation of Porro was pivotal in the path towards Caesarean becoming a safe procedure. For these reasons the figure of Eduardo Porro stands as the pioneer and one who could be regarded as one of the founding fathers of the modern Caesarean section.

### Figure 1

Figure 1: Plate from Porro's paper showing Julia Cavillini in convalescence following Caesarean section.



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