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## EDITORIAL

# Compound fetal presentation, uterine rupture and dreadful outcome: just a historical tale?

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## Introduction

Compound presentation is defined as presentation of a fetal extremity alongside the presenting part. It may involve one or more extremities (hand, arm and foot) with the vertex or the breech. The majority of compound presentations is represented by the fetal hand or arm presenting with the vertex [1]. Compound presentation complicates from 1 in 700 to 1 in 1000 deliveries [2]. It is more likely to occur when the pelvis is not fully occupied by the fetus because of low birth weight, multiple gestation, polyhydramnios or a large pelvis [2]. Rupture of membranes when the presenting part is still high also increases the risk of compound presentation, cord prolapse or both. During the process of external version, a fetal limb (hand, arm or sometimes the foot) can be “trapped” below the fetal head, becoming the presenting part when labor ensues.

Management of these individual events differs according to the finding and the circumstances. The literature on this subject is surprisingly scarce, although a number of case records have been published. One dreadful complication of compound presentation is represented by the uterine rupture, especially in case of obstructed labor. This rare but often catastrophic complication has a high incidence of fetal and maternal morbidity, due to hemorrhage, fetal anoxia or both.

Among the most common risk factors, besides malpresentation, direct uterine trauma and multiparity play a very important role, as the uterus may be weakened by thinning and stretching of muscle fibers during labor, especially with aging and repeated pregnancies [3].

Even nowadays, the premonitory signs and the short time for instituting definitive therapeutic action make uterine rupture a fearful event: epidemiological data on uterine rupture confirm the necessity that obstetricians take careful note of the classic signs and symptoms of uterine rupture, above all where prenatal diagnostic means are not available.

The tragic consequences of uterine rupture were obviously more common in the past, causing the unavoidable death of the woman.

In the developed countries, the diagnosis of compound presentation will prompt, in most cases, the performance of a caesarean section avoiding any further complication. However, in poor resource countries, this is not the case and many women today may experience the same destiny that Giovanna of Austria had a few centuries ago.

Giovanna was the unfortunate wife of Francesco de' Medici, the second Grand Duke of Tuscany. In this editorial, we reconstruct her death, in the light of the archive documents and of the paleopathological evidence, showing similarities with many maternal deaths still occurring in many countries around the world.

## Protagonists

Giovanna of Austria, the youngest daughter of the Emperor Ferdinand I of Habsburg was born in Prague, in 1547: as the sister of the incoming Emperor Maximilian II, she was married to Francesco, the son of Cosimo de' Medici, the Grand-Duke of Tuscany. Giovanna was triumphally welcomed in Florence in 1565 and many works of art were realized to celebrate their wedding, as the Vasarian Corridor, the Neptune Fountain and many frescoes in Palazzo Vecchio (Figure 1).

According to the archive documents and to the iconographic sources, Giovanna was not a pretty woman: she limped and suffered from a severe form of mandibular prognathism, a genetic disorder where the lower jaw outgrows the upper, resulting in an extended chin, which was typical of the Habsburg Family.

Giovanna delivered six daughters, one of whom, Maria (1575–1642), was destined to become queen of France. As females were excluded from the grand ducal succession, the birth of the male heir, Filippo (1577), was greeted with great relief.

Giovanna's and Francesco's married life was very sad, as Francesco had hopelessly fallen in love with a Venetian noblewoman and adventurer, Bianca Cappello (1548–1587), whose husband was stabbed to death in a brawl (1572). Bianca knew that if she gave Francesco a son, her place at court and in her prince's affections would improve greatly. In 1576, Bianca gave birth to Antonio (1576–1621), who was not openly acknowledged as Francesco's heir until after Joanna's death in 1578, when the boy was about 3 years old. But, Bianca had to wait until the death of Filippo in 1582 to gain full scope.

## Documents

According to documents of the time, in the month of April 1578, Giovanna was pregnant again, when she fell twice coming out of the church, where she had attended a ceremony. She was carried to Palazzo Pitti, where, after some time, she seemed to be recovered. After lunch, however, labor pains started and her



Figure 1. G. Bizzelli, Giovanna of Austria with Don Filippino (1586ca), Florence, Uffizi Gallery, Serie Aulica.

waters broke; and, according to the written documents, the delivery was complicated by a compound presentation.

The midwife tried to put the baby's arm in the uterus again, after having baptized it. Meanwhile, the uterus broke and the placenta was discharged.

The surgeon wanted to perform embriotomy but Giovanna asked to be left in peace and refused to take any medicine. Then, after some hours of agony, Giovanna died. An autopsy confirmed that the fetus had passed in the abdominal cavity as the uterus had been torn up. The surgeons were astonished to see that Giovanna's lower spine had just a hint of an "S" shape and they attributed her difficult deliveries to this defect [4].

### Paleopathological evidence

Giovanna was buried in the New Sacristy in San Lorenzo. In 1857, the Grand-Duke Leopoldo II of Lorraine ordered an inspection of the content of the coffins belonging to the members of the Medici Family, before burying them in a definitive way in the crypt of the Medici Chapels. The Commission charged with this task were amazed that the corpses of Francesco I and Giovanna of Austria, his wife, were perfectly preserved, even though they had died in 1587 and 1578, respectively.

Two painters, who attended this operation, Giuseppe Moricci and Enrico Pollastrini, eternalized their disquieting aspects (Cat. Gabinetto Disegni e Stampe Uffizi nr. 18988; 19549: 18985; 18986).

In 1947, these tombs were opened again and the corpses were studied by a group of anthropologists, who removed all hair and tissue and discarded it in order to take the proper measurements of bones, according to the trends in anthropology.

After almost 60 years, in 2004, the members of the Medici Project, a historic medical and paleopathological research organized by the Universities of Pisa and Florence performed



Figure 2. The backbone of Giovanna of Austria (Progetto Medici 2004. By accomplishment of Soprintendenza Speciale Polo Museale Fiorentino).

by G. Fornaciari and D. Lippi, opened their coffins again. But, the situation of their remains was radically changed because in 1947 anthropologists had cleaned the bones and wrapped them in paper. Additionally, the flood of the Arno River in 1966 had spoiled the remains.

The anthropological description of Giovanna's skeleton showed an anthropological age of 25–35 years, 1.57 m of height, middle-low skull and orbits, narrow face and nose [5].

Muscular insertions confirmed a limited physical activity.

A serious scoliosis of the lumbar spine with deformity of the pelvis and a bilateral congenital subluxation of the hip was shown. The pelvis confirmed clear evidence of the numerous difficult deliveries, as the enormous retro-pubic cavities and deep preauricular sulci of the sacrum. The most visible deformity consisted however in the serious S scoliosis of the lumbar spine, which, together with the great deformity of the pelvis, was responsible of the difficult deliveries and the rupture of the uterus (Figure 2).

### Poison hypothesis

The same documents which related the details of Giovanna's death underlined a very important fact: the presence at court, in those days, of Bianca's brother [6] providing the supposition that Giovanna had been poisoned by him, in order to let Bianca marry Francesco.

The Grand-Duke Francesco, in fact, had promised Bianca that he would have married her, if he would have had the formal opportunity. Giovanna's death would have satisfied this request, at the same time improving the political connections between Florence and Venice [7].

For this reason, when in 1857 Giovanna's tomb was opened and her corpse appeared so well preserved, the suspicion of poison was raised again [8].

During the exhumation of 1947, however, the state of preservation of the corpse was irrevocably ruined. Also, in 2004, the surface of the bones appeared completely smooth and no hair was found, making it impossible to research any trace of poison in Giovanna's remains [9].

## Conclusions

Even today, malpresentation is a true obstetric emergency, which requires additional medical maneuvers. Prompt caesarean section is now the treatment of choice with this complication, but in 1578 it was not at all common. As a matter of fact, prior to the arrival of caesarean section, the fetus usually died during protracted labor and the mother's life was at risk as well for infection, uterine rupture and/or bleeding. On occasion, if the baby was macerated and small, it collapsed sufficiently to be delivered, but it was not the case of Giovanna's baby, who died on that 11th April of so many centuries ago. One reason may be the fact that Giovanna refused any "life-saving" treatment as proposed by the doctors, related to embryotomy. This maneuver would have facilitated the delivery of the fetus, possibly avoiding uterine rupture. However, the choice of Giovanna was respected and she died. This fact would have opened an ethical debate today: should we fulfill the patient's willingness not to perform any maneuver or should we apply to a third party, a judge, in order to make a life-saving decision for her, as we do for a patient who refuses a blood transfusion due to their religious beliefs [10]?

At that time, bioethical issues were not even raised. Also, today, in the "industrialized world," this situation does not happen often [11]. However, in poor resource countries, uterine rupture for obstructed labor is still the second largest cause of maternal death when an emergency caesarean section is not available and the patient is transferred to a hospital, usually a few minutes before the unavoidable death.

**Declaration of Interest:** The authors declare no conflicts of interest.

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