

# First Reconstructive Plastic Surgery of the Perineum in a Hominin *Pan paniscus* (Bonobo) and Plea by a Plastic Surgeon for Surgery for the Benefit of All Hominins (Members of the Human Lineage)

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## Abstract

We present, for the first time, the repair by plastic surgery procedures of a large loss of perineal substance in a bonobo (hominin *Pan paniscus*). A 20-year-old male bonobo living in captivity in the Lola Ya Bonobo Sanctuary in Kinshasa in the Democratic Republic of the Congo was attacked by another bonobo. It was a large perineal wound through which urine flowed, located between the penis and the testicles, taking part of the anterior and posterior urethra, the bladder, as well as the elements of the spermatic duct. To repair the large loss of perineal substance, a pedicled flap of scrotal skin was removed, and then turned over, cutaneous surface on the trench of the loss of bladder substance and the urethral lumen. The postoperative course was satisfactory with healing by the first intention of the surgical wound, despite the wild postoperative behavior of the patient (removal of the vesicourethral catheter and protective plaster). We observed in the short term an urethro-cutaneous fistula, left in natural healing. The reconstructive surgery procedures applied in humans can also be applied with satisfactory results in bonobos, a species in the process of extension and whose members are our closest cousins. The bonobo is genetically close to humans. Based on this first successful experience, we advocate for reconstructive plastic surgery for all hominins (members of the human lineage), if indicated.

## Keywords

Bonobo, Perineal Trauma, Extensive Loss of Soft Tissues, Reconstructive

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## 1. Introduction

Bonobo (hominin *Pan paniscus*), called “dwarf chimpanzee”, “pygmy chimpanzee”, “chimpanzee of the left bank of the Congo”, or “black-faced chimpanzee”, is a species of primates of the family Hominidae. Close to the common chimpanzee (*Pan troglodytes*), it is distinguished above all by a social organization that uses sexual relations and a scapegoat as a means of resolving conflicts within the group [1]. The name “bonobo” derives from the distortion of the name of the town of bolobo, located on the banks of the Congo River, where the first specimens were captured in the 1920s [2]. It is the German anatomist Ernst Schwarz, intrigued by the presence in the reserves of the colonial museum of Tervuren (Africa Museum) of a skull too small to be that of a common chimpanzee, as well as the Belgian professor Henri Schouteden who directed this Tervuren Museum from 1927 to 1946, who discovered the bonobo [3] [4] [5].

This quadrumane, endemic to the Democratic Republic of the Congo, has a body and a head that measure approximately 82 cm. The male measures in semi-bipedal position about 1.19 m for a weight ranging from 37 to 61 kg (45 kg on average). The female measures 1.11 m for a weight ranging from 27 to 38 kg (33.2 kg on average) [6]. Sexual dimorphism is less pronounced than in most primates. We can also notice that the bonobo has a more blackish hue, red lips and external female sexual organs [7]. Its life expectancy in the wild is 45 years and it can reach 60 years in captivity [7]. The bonobo is genetically close to humans. Phylogenetic methods have established that *Pan paniscus* and *Pan troglodytes* are the closest primates to humans. Between two humans, the genotypes are 99.9% similar [8], while the resemblance between humans and bonobos is 98.7% [9]. About 5.1% of the human genome is genetically close to the bonobo genome. But 2.52% of the human genome is closer to the bonobo genome than that of the chimpanzee [9]. According to analyzes based on a molecular clock with a mutation rate of 10<sup>-9</sup> mutations per year, humans diverged 4.5 million years ago, while the bonobo-chimpanzee branch dates back to 1 million years [8].

The practice of reconstructive plastic surgery in the hominin *Homo sapiens* (man) is very old [10] [11]. Susruta (7th century BC) describes nasal reconstruction procedures. Gaspare Tagliacozzi's (1546-1599) book, *De Curtorum Chirurgia per Incitem*, was the first treatise on plastic surgery, in which he described several operations, in particular his method of rhinoplasty. The expression “plastic surgery” was first used by Eduard Zeis, for the title of his book *Handbuch der Plastischen Chirurgie* in 1838 [10] [11].

In the literature, we did not find a published report on perineal repair or a treatise on plastic surgery concerning *Pan paniscus* (bonobo) hominins, an expanding species whose members are our closest cousins. We present, for the first

time, the repair by plastic surgery procedures of a large loss of perineal substance in a bonobo (hominin *Pan paniscus*). Our work is intended to be a plea for reconstructive plastic surgery for the benefit of all hominins (members of the human lineage), if indicated.

## 2. Presentation of the Case

A 20-year-old male bonobo living in captivity in the Lola Ya Bonobo sanctuary in Kinshasa in the Democratic Republic of the Congo was attacked by another bonobo. This trauma caused the bonobo to have a large perineal wound through which the urine flowed. Surgical repair was decided.

After putting the bonobo to sleep with Ketamine administered using a hypodermic animal capture gun (Figure 1), we placed a Foley type 16 urethro-vesical catheter (Figure 2), and we disinfected the operative area and placed sterile drapes. Intraoperatively, surgical exploration discovered a large loss of substance from the anterior perineum between the penis and the testicles, taking part of the anterior and posterior urethra, the bladder, and the elements of the spermatic duct (Figure 3).

We opted for the repair of the loss of bladder and urethral substance by reversal of a ventral pedunculated flap of the scrotal skin. The operating protocol was as follows: Tracing of the penile skin flap—Removal of the pedicled flap of scrotal skin—Transposition, rotation and inversion of the flap—Bladder and urethral reconstruction—Sutured flap—Skin closure.

Thus, after drawing the flap (Figure 3), we removed it in contact with the tunica albuginea (Figure 4) to maintain a thick cellulovascular “mattress” (represented by the dartos), ensuring good vascularization, it would be a wide-based flap (Figure 5). We created a subcutaneous tunnel (Figure 6) for the passage of the flap. Then, we turned the flap over, cutaneous surface on the trench of the defect bladder and urethral lumen (Figure 7). The flap was sutured to the edges of the defect using two sutures of single-strand absorbable 4.0 suture (Figure 7). The surgical wound was closed without tension by performing a scrotal suture covering the distal end of the flap in separate stitches of 3.0 rapid absorbing suture (Figure 8). We immobilized both elbows and both hands with resin casts (Figure 9), preventing the bonobo’s hands from reaching the operated area.

The immediate post-operative follow-up was marked, on waking up from anesthesia, by the removal of the resin casts by the Bonobo using his teeth and feet, and also the removal of the urethro-vesical catheter placed intraoperatively (Figure 10). The end result was satisfactory. The bonobo has healed well with recovery from its activities (apart from sexual intercourse). We noted a short-term urethro-cutaneous fistula (Figure 11), left to heal naturally.

## 3. Discussion

Why operate on a bonobo using plastic surgery procedures? There are several arguments in favor of plastic surgery in favor of bonobos. First, the bonobo is



**Figure 1.** Capture using a stun gun.



**Figure 2.** Foley catheter placement.



**Figure 3.** Lesion assessment and drawing of the flap.



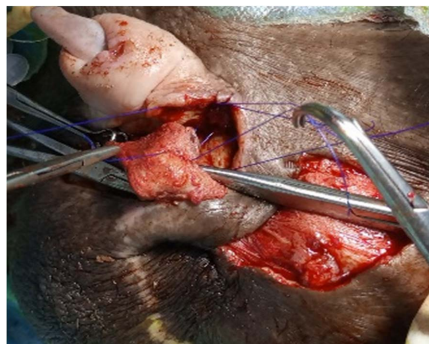
**Figure 4.** Removal of the flap in contact with the tunica albuginea.



**Figure 5.** Broad-based flap.



**Figure 6.** Creation of a subcutaneous tunnel for the passage of the flap.



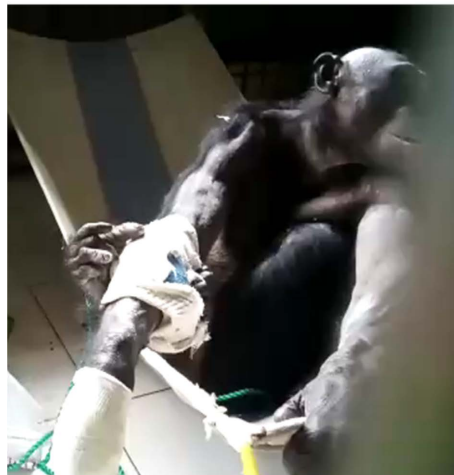
**Figure 7.** Turning of the harvested flap, cutaneous surface on the trench of the loss of bladder substance and the urethral lumen.



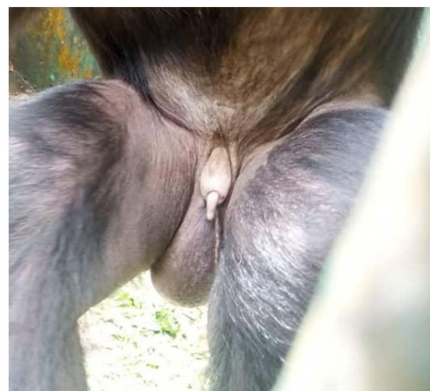
**Figure 8.** Skin closure.



**Figure 9.** Making resin casts on the elbows and both hands. The bonobo operated in a hammock (recovery room).



**Figure 10.** On awakening, removal of casts and urethro-vesical catheter by bonobo.



**Figure 11.** Satisfactory results. Healing by first intention. Resumption of activities. Short-term presence of an urethro-vesical fistula.

genetically close to humans. Phylogenetically, the resemblance between humans and bonobos is 98.7%. About 5.1% of the human genome is genetically close to the bonobo genome [9] [10]. All members of the human lineage (hominins) can

benefit from the universal right to health. Of course, members of the human lineage who have the capacity and the means to give care, that is to say homo sapien hominins (humans), can do it for others. In addition, the bonobo is on the International Union for Conservation of Nature (IUCN) red list of threatened species, its conservation status has been at the level of “endangered” since 1996. Populations are in decline. He was only “vulnerable” in 1986.

The perineum is a difficult border region to reconstruct due to its functional and cosmetic role. The presence of the external genitalia and the urethra makes this anatomical area particularly complex to restore. The risks of scar disunity and infection are also increased by the proximity of the anus. The management of a loss of perineal substance must take into account four key parameters: the etiology, the general condition of the patient, as well as the location and dimensions of the tissue deficit. The anatomical particularities of the perineum in bonobos [5] [6] did not facilitate repair.

We applied a repair technique borrowed from human plastic surgery. Techniques for covering and filling perineal defects have evolved considerably in recent years [12]. The historical rectus abdominis and gracilis musculocutaneous flaps are still very useful for major dilapidations, but they now have to compete with neighboring fasciocutaneous flaps that are simpler and faster to perform, as well as perforator flaps that are more respectful of muscle function. The lotus petal flap and the fasciocutaneous pudendal flap centered on the terminal branches of the internal pudendal vessels are particularly interesting for their simplicity and efficiency [13]. They provide a solution to most small or medium defects in the region. Pediculated perforator flaps from the abdomen, gluteal region or antero-lateral thigh are more technically demanding.

The application of different techniques of reconstructive plastic surgery [12] [13] [14] requires adaptation in the bonobo, given its wild behavior and the absence of collaboration between doctor and patient. These last two points are also part of the difficulties encountered in taking this bonobo.

We observed in our operated bonobo an urethro-cutaneous fistula which we left in natural healing. In humans, Dodat *et al.* found 58 fistulas after 611 first-hand urethroplasties, *i.e.* 9.5% [15]. Its frequency of occurrence varies according to the series [16]. In our case, this urethral fistula is not surprising, given the severity of the lesions repaired and the postoperative behavior of the bonobo.

#### **4. Conclusion**

It is possible to repair the large losses of perineal, vesico-urethral substances in bonobos by a pedicled flap of the scrotal skin. The still wild nature of our bonobo cousins during pre- and post-surgery remains a challenge to overcome. The reconstructive surgery procedures applied to humans can also be applied to bonobos with satisfactory results. The bonobo is genetically close to humans. Based on this first successful experience, we argue for reconstructive plastic surgery if it is indicated for all hominins (members of the human lineage).

## Ethics Statement

Three fundamental principles of research ethics were respected in the present study: respect for the animals, beneficence and justice.

## Acknowledgements

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## Author's Contributions

K.K., a plastic surgeon, operated on the bonobo and wrote the manuscript.

## Conflicts of Interest

The author declares that there is no conflict of interest.

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