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# Synthetic oxytocin and hastening labor: reflections on the synthesis and early use of oxytocin in Brazilian obstetrics

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## Abstract

This article reflects on the medicalization of childbirth, focusing on the development of synthetic oxytocin in 1953. Specifically addressed is the social life of oxytocin; in other words, its synthesis, stabilization, and use in obstetrics to hasten labor. Two Brazilian obstetrics journals of this era were surveyed to analyze the early use of synthetic oxytocin in Brazil in the late 1950s, along with obstetric arguments for or against its use. Notable in this period is the increasingly central role of the obstetrician in childbirth, as well as the recommendation to use different interventions linked together (particularly oxytocin) to shorten labor.

**Keywords:** childbirth; obstetrics; oxytocin; hormones; medicalization.



Since the late nineteenth century, increased medicalization can be observed in society in general, and particularly in pregnancy, labor, and childbirth; in other words, certain phenomena which previously had not been considered pertinent to the medical sphere are increasingly being included within the medical “jurisdiction” (Conrad, 2007). As noted by Nakano, Bonan, and Teixeira (2015, 2016), labor and birth practices in Brazil have undergone profound changes, especially since the mid-twentieth century, with growth in hospitalization and commodification. Furthermore, technological advances in medicine (ranging from new assisted reproduction technologies to obstetric ultrasound) accentuate this process even more sharply.

Oxytocin is a hormone produced by the hypothalamus and stored in the posterior pituitary gland. Because it stimulates uterine contractions it is central to labor, and it is also important to breastfeeding because of its role in the process of milk let-down. As we shall see in this article, this hormone was synthesized at the beginning of the 1950s, and its synthetic industrialized version began to be used in obstetrics to induce and accelerate labor.

Although it is not recommended by the World Health Organization (WHO), synthetic oxytocin is routinely used in many Brazilian maternity services to boost and speed contractions, which has been reported in several studies (Diniz, 2001; Hirsch, 2015; Tornquist, 2004; Leal et al., 2014). In a study performed at a public maternity hospital in Salvador, McCallum and Reis (2008) observe that oxytocin (which users called “saline solution”) was dreaded by women for increasing their pain and discomfort. Diniz (2005) similarly shows how the pain of childbirth becomes largely iatrogenic; in other words, it is amplified when oxytocin or other routine interventions are implemented.

Today in Brazil, activists in the “humanized childbirth” movement and researchers in collective health in general are warning of excessive interventions during childbirth. Diniz and Chacham (2006) argue that there is a “cascade effect” in the use of interventions in childbirth, with one intervention causing problems which in turn require another intervention, and so forth. Furthermore, the rate of cesarean sections is notably high in Brazil:<sup>1</sup> 38% of births in the public sector and 86% in the private sector (Brazil, 2008), despite the WHO’s recommended rate of 10-15% (WHO, 1985).

In this study we begin from the perspective of social studies of science and technology, particularly the problematization of the borders between nature and culture, science and society (Haraway, 2009; Fausto-Sterling, 2000; Oudshoorn, 1994), and propose the concept of co-production, which understands science, technology, culture, and politics to be intertwined and inseparable elements (Jasanoff, 2004). In this sense, oxytocin can be seen as simultaneously semiotic and material.

Additionally, oxytocin is a hormone which is produced by the female body and also synthesized in the laboratory. Our focus is therefore the synthetization of the hormone and its uses as a technology for accelerating childbirth. We start from the perspective of Whyte, Geeste, and Hardon (2002), considering pharmaceuticals and medications as substances that can affect bodies, phenomena that have a social life along with the substances that produce these effects. In this sense, we will reflect on the process of medicalizing childbirth in Brazil, specifically focusing on the development of synthetic oxytocin and its use in

assisted birth. We will analyze its arrival to Brazil in the late 1950s and early 1960s, and the obstetric arguments from that era recommending or advising against its use. We will examine oxytocin not as an isolated mode of intervention, but rather connected to other forms of intervention and other attempts to control delivery, and therefore within a broader process of medicalization. In this way, by analyzing the development and use of a specific technological artifact, we intend to shed light on the process of medicalizing childbirth in general.

***Revista de Ginecologia e d'Obstetrícia e Anais Brasileiros de Ginecologia*  
(*Journal of Gynecology and Obstetrics and Brazilian Annals of Gynecology*)**

Our research and analysis will utilize two Brazilian obstetrics journals from the mid-twentieth century: the *Revista de Ginecologia e d'Obstetrícia* (*Journal of Gynecology and Obstetrics*, RGO) and *Anais Brasileiros de Ginecologia* (*Brazilian Annals of Gynecology*, ABG). These publications were considered the most important in this area at that time, and therefore were quite influential among Brazilian obstetricians. Both were published in Rio de Janeiro and featured collaborators from all over the country; in its final years, RGO moved to São Paulo. The two journals contained original articles in Portuguese, as well as Portuguese summaries of articles originally published in international publications in other languages. They also included advertisements for pharmaceutical laboratories, medications, and medical products in general; these advertisements were also part of our analysis. We surveyed each of these journals from 1950 until its last year of publication (1978 for RGO and 1969 for ABG), looking for publications (articles, abstracts, event notes, and advertisements) that addressed themes such as the use of oxytocic drugs or oxytocin in delivery, uterine contractility, induction, or narco-acceleration of labor. We selected the 1950s as the initial period of analysis because oxytocin was synthesized in 1953. In this way, our goal was to map early discussions of this substance's use in Brazil.

The ABG was founded in 1936 by the chair of clinical gynecology at the Universidade do Brasil School of Medicine, Arnaldo de Moraes, and was an official publication of the Brazilian Society of Gynecology (Teixeira, Löwy, 2011). It was published monthly until 1969. Meanwhile, RGO was also published monthly from 1907 to 1978, and was one of the longest-running Brazilian medical journals. In its final years of publication after 1962, it was the official publication of the Brazilian Federation of Gynecology and Obstetrics Societies (FEBRASGO) (Freitas, 2005).

After surveying the publications, we read the journal abstracts to select 130 pieces for full reading and analysis (63 from ABG and 67 from RGO). The articles were mostly concentrated in the 1960s, with 77 articles on the topic. The authors included great figures in Brazilian obstetrics such as Adeodato Filho, Bussamara Neme, Jorge de Rezende, Moyses Paciornik, and Otávio Rodrigues Lima. Since our analysis focuses on the arrival and utilization of oxytocin in childbirth, these authors will be cited in consideration of how their arguments helped constitute the social life of this drug, although their trajectories and biographies were not the focus of our investigation.

## **Accelerating labor: a history of the synthesis of oxytocin**

From a historic point of view, the process of medicalizing the female body (and more specifically pregnancy and childbirth) cannot be considered without analyzing how medicine targeting women developed. The researchers Fabiola Rohden (2001) and Ana Paula Martins (2004) analyze the development of the two “women’s sciences” (gynecology and obstetrics) in the specific context of Brazil in the nineteenth and twentieth centuries.

Rohden (2001) states that gynecology emerged within a certain conception of difference between the sexes and genders, which can be seen from the differentiated interest in medicine with regard to men and women. For example, there is equivalent of gynecology for men, since men are only be treated when sick or beyond the bounds of normal, while women are expected to be studied and treated even in their normal state, and are considered potentially pathological in nature.

Meanwhile, Martins (2004) analyzes the development of obstetrics, noting how obstetric care in Brazil was mostly administered in the home until the end of the nineteenth century, primarily by midwives. But in the twentieth century Brazilian obstetricians begin to champion the safety and advantages of giving birth in a hospital as opposed to at home. The author states that this campaign encouraging assisted pregnancy and the construction of specific hospital spaces for gynecological and obstetric care effectively began the process of medicalizing the female body in Brazil. It is also important to note that this campaign arose from moralizing discourse about motherhood, which was supported by scientific knowledge at the time.

The medicalization of childbirth is consequently marked by shifting labor from home to the hospital, and moving from midwives to obstetric physicians. Mott (2002) states that throughout the twentieth century, maternity hospitals were gradually promoted and recommended as the safest places for childbirth, while at the same time labor began to be seen as a potentially dangerous medical event with interventions recommended ever more frequently. Notable new techniques in the second half of the twentieth century included the use of substances to accelerate and shorten labor, like synthetic oxytocin (as we shall see below). We shall also see how these technologies seem to contribute to the process of medicalization in general, and specifically to the migration of labor from homes to the hospital, and from midwives to obstetricians.

## **From pituitary gland extracts to “purified” synthetic oxytocin**

One of the first landmarks in knowledge about oxytocin took place in 1895, when the English researchers George Oliver and Edward Sharpey-Schafer first described some effects of the pituitary gland, or neurohypophysis. They found that injecting pituitary gland extracts into mammals increased blood pressure. This was the “pressor effect” effect of pituitary extract, which was also accompanied by antidiuresis (Magon, Kalra, 2011; Hertog, Groot, Dongen, 2001; Pitts-Taylor, 2016).

Some years later in 1906, the British pharmacologist Henry Dale (who was also conducting research in mammals) observed that a substance in the extract was able to stimulate uterine contractions. Dale found that he could initiate labor in a pregnant cat by injecting pituitary

gland extract. He consequently named the substance oxytocin, from the Greek terms *oxys* (“fast”) and *tokós* (“birth”). Substances capable of “accelerating” childbirth by stimulating uterine contractions then came to be called oxytocic substances.<sup>2</sup> Meanwhile, a prepared pituitary gland extract was first marketed and sold for obstetric clinical use under the trade name Pituitrin (Magon, Kalra, 2011; Hertog, Groot, Dongen, 2001; Pitts-Taylor, 2016).

In the Brazilian articles analyzed here, the pituitary gland extract preparation (Pituitrin) was also known among obstetricians as “liquid forceps” as a biochemical alternative to the extractive tool. But because it was so powerful and effective, it was also considered “more dangerous than dynamite”<sup>3</sup> if used indiscriminately, as shown in the excerpts below:

The ‘disasters and depredations’ caused by Pituitrin gained it the ‘dubious honor of the nickname liquid forceps’ (Lima, Kamnitzer, 1965, p.218; emphasis added).

Pituitary extracts are the most physiological stimulant known for the human uterus, and when used correctly yield excellent results. But they can produce effects which are fatal for the fetus, translated into severe anoxia, and for the woman, uterine rupture, if certain basic precautions are neglected. ... There will occasionally be accidents with its use since it is a ‘substance more dangerous than dynamite’ (Rocco, 1957, p.93; emphasis added).

‘Liquid forceps’ had its supporters, and ‘thousands of fetuses paid with their lives and hundreds of wombs were ruptured’ because of unnecessary and ignorant use of the substance (Lima, 1962, p.13; emphasis added).

Maria Lúcia Mott (2002) notes that Pituitrin is thought to have first been used in Brazil during the 1910s. Although no specific date was found in our survey of the material, the authors of the articles we analyzed agree in stating that Pituitrin was widely used in obstetrics since the beginning of the twentieth century. In an article published in 1957, Serrano observed that the obstetrician Fernando Magalhães, considered the “father” of Brazilian obstetrics, used this substance at the beginning of the century in conjunction with a sedative, calling the compound “lucina:”

Magalhães used the Pituitrin of that time ... preceding it with a sedative for labor pains, and created ‘lucina,’ which was composed of two elements – an ampule of panlaudon applied at the beginning of this method for less painful and shortened labor, and another ampule, Pituitrin, a fast-acting intramuscular injection to increase uterine contraction, with pain sedated by a narcotic injected twenty minutes prior (Serrano, 1957, p.95-96).

However, the composition of the pituitary extracts was not exactly the same as the oxytocin which was synthesized later. This is because the pituitary gland contains oxytocin as well as another hormone, vasopressin. More than half a century passed between Henry Dale’s naming of the substance and reporting its effects in the uterus and the isolation, sequencing, and synthesizing of oxytocin and vasopressin. The distinction between the two hormones secreted by the posterior pituitary gland and their specific actions was essential to further research: oxytocin was responsible for uterine contractions, and vasopressin was responsible for raising blood pressure and antidiuresis. With this clarified, it was only in 1953 that the American chemist Vincent Du Vigneaud synthesized the molecule (Du Vigneaud et al., 1953a), and received the Nobel Prize in recognition two years later.<sup>4</sup>

## Networks and alliances

The process of isolating oxytocin is reported in the Brazilian articles analyzed herein as a process of “purification,” since the administration of retro-pituitary extracts, “in addition to producing an increase in uterine contractility, produced a series of effects,” (Grillo, Amaral, Hintz, 1975, p.105) as can be seen in the excerpt below:

Over many years obstetricians utilized natural oxytocics, and eagerly sought encouraging results, proposing the most varied techniques for their use. But ‘the impurities and imperfections inherent in such products’ did not permit consistent results, and certain conclusions could not be drawn. Later, the appearance of synthetic oxytocics renewed interest in these investigations, and more recently with the appearance of methods to extract them from natural products, they ‘became more stable and pure’ (Ciari Jr., 1967, p.211; emphasis added).

This process of isolation and “purification” was also described by Du Vigneaud himself (1956, p.969):

The purification was a slow process, for the amount of active principles in the gland is extremely small, the principles are unstable, and the bioassays involved are very time-consuming. Hundreds of thousands of hog and beef glands were used during the course of the investigations.

As seen above, oxytocin was synthesized from bovine and porcine glands. In her classic work on endocrinological development and the invention and synthesis of the so-called sex hormones, Nelly Oudshoorn (1994) analyzed the material conditions needed for this development to take place. Synthesizing sex hormones depended on the availability of millions of liters of urine and tons of ovaries and testes from animals, as well as access to slaughterhouses and animal breeders. As this author notes, access to these materials for research would not be viable if the scientist was isolated in the laboratory; instead, it was only possible through a network of alliances between scientists and the pharmaceutical industry which was emerging at this time, and facilitated and mediated this access. Oudshoorn argues that the seemingly simple question of which materials scientists used to synthesize hormones leads to a more complex analysis of how science functions. In this way, she draws attention to the need to consider hormones (and also the scientists who “invented” and synthesized them) as heterogeneous elements that comprise a complex network of interactions.

Oudshoorn refers to an earlier period, between the late 1920s and 1930s, when estrogen, testosterone, and progesterone were synthesized (in 1929, 1937, and 1939, respectively). We can consequently imagine that in the 1950s, when the studies were conducted on oxytocin, the alliances between scientists and the pharmaceutical industry were even more established. In several articles, and in his Nobel Prize acceptance speech, Du Vigneaud cites collaboration by pharmaceutical laboratories such as Eli Lilly and Parke-Davis.<sup>5</sup>

Du Vigneaud also specifically thanks Parke-Davis for “source material for the preparation of purified oxytocin” (Du Vigneaud et al., 1953b, p.949). It is important to note here that the Parke-Davis laboratory, which was established in the United States at the end of the nineteenth century, was one of the first to sell Pituitrin. The alliance between Du Vigneaud

and Parke-Davis seems to have been fruitful for both parties, and after the synthesis of oxytocin, the company sold Pitocin, the synthetic “purified” version of the hormone.

In 1955, shortly after Du Vigneaud and his team published their study, a group of researchers led by Roger Boissonnas, who worked in the Sandoz pharmaceutical laboratory in Switzerland, published an article reporting a new method for synthesizing oxytocin (Boissonnas et al., 1955). In this way, Sandoz was responsible for selling another version of synthetic oxytocin similar to Parke-Davis’s product called Syntocinon.

In the beginning, the oxytocin manufactured by the Swiss company seems to have had a greater reach in Brazil. In the articles analyzed, the majority of authors report using or make reference to Syntocinon, not Pitocin. There are also authors who expressly thank Sandoz for providing samples of Syntocinon, which indicates the creation of a network between gynecologists and the pharmaceutical industry in Brazil meant to disseminate the product and expand its consumption. Furthermore, Sandoz advertised heavily in both the *Journal of Obstetrics and Gynecology* and the *Brazilian Annals of Gynecology* for other products sold by the company in Brazil.

The first large advertisement for Syntocinon appears in 1959, in the September issue of the *Journal of Gynecology and Obstetrics*, and is shown in Figure 1:



Figure 1: Advertisement for Sandoz's Syntocinon in the *Revista Brasileira d'Obstetrícia* ([Syntocinon], 1959, p.33)



The figure features an illustration of a fetus in a womb, with the other parts of the pregnant woman's body absent. An ampule of the product is directly attached to the uterus. The absence of the pregnant woman contrasts with the presence of medical and hospital equipment and the ampule of oxytocin in the image. The advertisement highlights Sandoz's pioneering work, and Syntocinon is touted as the "first industrial realization of oxytocin synthesis" and "the first synthetically-obtained oxytocin." The information that Syntocinon, unlike earlier extracts, did not contain the hormone vasopressin is also highlighted. We can assume that Syntocinon reached the Brazilian market before Pitocin and Parke-Davis; according to the publication date for this advertisement, this occurred in the late 1950s.

Another network of alliances that Oudshoorn describes in the process of synthesizing sex hormones took place between scientists and clinicians, in other words physicians who provided direct care. This alliance can also be observed in the case of oxytocin. In his Nobel acceptance speech, Du Vigneaud (1956, p.973) recognized the importance of this collaboration, which was essential for assays to determine whether synthetic oxytocin had the same effects as pituitary gland extract:

We were fortunate at this stage to have the collaboration of the Lying-In Hospital group of the New York Hospital-Cornell Medical Center on the use of our highly purified natural oxytocin in induction of labor and in milk ejection, for the natural and synthetic material were now compared on human subjects. The synthetic product was fully effective in stimulating labor in the human being and in milk ejection and could not be distinguished from the natural oxytocin in its action.

Oudshoorn argues that sex hormones were drugs "waiting for" diseases. In other words, at the time they were synthesized, estrogen, progesterone, and testosterone had not yet been explored for various uses such as contraception, "sexual therapies," or menopause. The hormonal contraceptive pill itself, for example, was only developed and launched years after the synthesis of these hormones, in the 1950s. However, it is our argument here that the case of oxytocin was different. Synthetic oxytocin was not a drug "waiting for" a purpose, but precisely the opposite. As we have seen, its oxytocic action (its ability to "accelerate" labor) had already been described since the early twentieth century, and pituitary gland extracts were already being used in obstetrics, as were other products with the same purpose (Hertog, Groot, Dongen, 2001). Furthermore, the rapid manufacturing and marketing of synthetic oxytocin by the pharmaceutical industry – including its export to Brazil – also seems to point in this direction, namely a rapid "stabilization" of oxytocin.

Another important fact that allows us to consider previous motivations for the clinical use of oxytocin in obstetrics is the fact that the synthetization and subsequent commercialization of oxytocin permitted and drove several studies on the physiology of childbirth and uterine contractility. One of the most important studies was by the Uruguayan physicians Roberto Caldeyro-Barcia and Hermógenes Alvarez, which became a reference in the study of uterine contractility and created units of measure for uterine contractions known as Montevideo units.

Major concern with the study of uterine contractions can be seen in the journals analyzed, starting in the 1950s. For example, according to the obstetricians Jorge Lima

and Plínio Ferraz (1965, p.209), uterine contractions “should comprise the maximum problem of obstetric investigations,” a “fascinating theme that probably will present the solution to many questions among obstetricians” (p.214). The practical applications of these studies included “intervening in the progress of labor, correcting dyskinesias [motor activity disorders], accelerating or sometimes even inducing it” (Gameleira, 1965, p.304).

Here we should reflect on how research on uterine contractility ultimately engenders definitions of normality and abnormality, for example defining the “best characteristics” of contractility for a “normal, fast delivery” (Caldeyro-Barcia, Alvarez, Reynolds, 1951, p.335). Similarly, several studies (especially in Uruguay) attempted to determine the optimal duration of labor in an attempt to also define abnormalities, such as “prolonged labor.” It is interesting to note how synthetic oxytocin has two functions in this regard. On the one hand, it assists in studies like those by Alvarez and Caldeyro-Barcia, which measure uterine contractions and in turn define the ideal of normality. At the same time, by being able to “accelerate” labor it provides a new standard of comparison, in other words, a different notion of temporality in childbirth that is “accelerated.”

### **Oxytocin and the hospitalization of labor in Brazil**

In this period, the concept of “narco-acceleration” of childbirth began to be established in Brazil, as seen below:

Obstetricians everywhere seek to shorten the various stages of labor in the interests of avoiding unnecessary and prolonged suffering for the woman-mother. This led to the emergency of different methods of accelerating childbirth, nearly all utilizing either oxytocics on their own or combined with analgesic methods and extractive resources (Serrano, 1957, p.96).

The recommendation to accelerate labor can be read as a clear recommendation for childbirth in the hospital, in contrast with a home birth. As stated by Rogerio Rocco (1957, p.92): “Accelerating labor in the home is not recommended, since it requires oxygenation equipment and the ability to perform obstetric interventions at any time and immediately resolve difficulties via the upper route [cesarean section].” Furthermore, hospital birth was also recommended in some of the articles analyzed as a pre-requisite for hastening labor. For example, this indication included “enhanced obstetric experience” and “accurate surveillance,” with the patient under constant observation and frequent measurements of blood pressure, pulse, temperature, as well as monitoring fetal heartbeat (Rocco, 1957; Silveira et al., 1965).

The intense emergence of health centers and private philanthropic polyclinics in major Brazilian cities in the 1920s extended hospital care, which previously had been restricted to the poor, to the middle layers of society. However, surgical and obstetric treatments in the home environment still continued during this period (Vieira, 1983). Starting in the 1950s, hospital care broadened significantly. Following the American concept that large hospitals should be built to focus medical care on various ailments, a large number of hospitals, clinics and maternity hospitals began to be built, many linked to health pension institutes.

In the latter half of the twentieth century, the middle classes in urban areas looked to hospitals as the main space directed toward health. In this context, labor also became a hospital event, a process based on the strengthening of social medicine, which at that time was characterized by a set of institutions (retirement and pension institutes) linked to different professional categories and maintained by resources from workers, employers, and the state, and by increased numbers of maternity hospitals and private health clinics to serve the levels of society with greater purchasing power (Oliveira, Teixeira, 1985).

Childbirth's entry into the hospital universe means that its dynamic increasingly had to accompany the organizational requirements of the institution. Since the nineteenth century, hospitals played an important role in creating bureaucratic management of diseases and organizing knowledge, communication, and practices for the management of bodies (Rosenberg, 2002). One of the foundations of this management was diagnosis, and also extended to the creation of protocols to standardize procedures; one objective was the management of time spent within the institution. The use of oxytocin in birth-related time management took on a prominent role in this institutional space. Initially, its use was justified for the comfort of laboring women, reducing the length of their suffering and shortening their stay in the delivery room to reduce the chance of infection. Its use then came to be proposed as routine, as seen in the excerpts below:

The main indication of narco-acceleration is a quick end to labor, encompassing benefits for the laboring woman, who does not suffer pain or anxiety; for the fetus, to avoid the aggressions to the cephalus during intermittent uterine contraction for hours at a time; and for the obstetrician, who saves physical and mental energies in order to better apply them to other cases (Carvalho, Aleixo, 1966, p.93).

Obstetricians can utilize this method routinely, as long as they observe the conditions of application (p.100).

In this way, the alliance between the organizational demands of hospitals and the possibilities opened up by the use of oxytocin drove rapid expansion in the use of this substance.

### **Oxytocin in childbirth and the debate between “abstentionists” and “interventionists”**

In the late 1950s a watershed can be seen in the articles outlining a dispute between two models of assistance that intensified in the following decade: the “abstentionist” model and the “activist” or “interventionist” model, as illustrated by the excerpt below:

There have always been and always will be extreme modes of thinking that shape childbirth care according to vision; ranging from total abstention to unbridled activism. ... Between these extremes are the majority group, the moderates, who swing back and forth prudently, always attracted by the current trend (Lima, Kamnitzer, 1965, p.216).

It is noteworthy that in the analyzed material, “abstentionism” is less defended and valued than the “activist” model. But even though the activist model prevailed among the obstetricians who publish in the journals, need to legitimize and defend this model

was also seen, revealed by the significant criticism of abstention. To the physicians who advocated interventionism, the abstentionist model was archaic and backward, ancient dogma from “classical obstetrics,” while interventions were thought to be more “modern” and therefore better:

No matter how abstentionism is stigmatized as backwards, its stalwart defenders will never be convinced to abandon it, stuck in their conservative and archaic thinking, insensitive to the change that is underway in the current medical mentality, namely prophylactic. Associated with this modern conception of the facts, we intervene whenever it becomes necessary to preserve the normal conditions of childbirth, closely linked to suppressing pain and accelerating labor (Silveira et al., 1965, p.60).

Until recently, the view prevailed that an act considered among the most physiological should take place without any intervention whatsoever. Undisturbed abstention in these circumstances was one of the main tenets of classical obstetrics. The ancient art was purely extractive (Rocco, 1962, p.205).

The “activism” of the obstetrician in childbirth – that is, an “active” posture utilizing the wide array of interventionist techniques available, and not a “passive” waiting stance – was seen by the doctors who defended it as a result of progress in obstetrics, which demolished its “traditional myths” (Bastos Filho, 1962, p.156). These same defenders also stated that previously in the abstentionist model, obstetricians only “‘wait’ on the patient, confident and aware of spontaneous birth, ‘protracted by the millimetrical progression of labor’” (Bastos Filho, 1962, p.155; emphasis added). They believed that the new studies of the physiology of pregnancy and childbirth and new therapeutic resources (including synthetic oxytocin) permitted change in the model of obstetric care. The excerpt below refers to the new medicines as enriching the “obstetrics arsenal,” allowing the doctor to be less passive in relation to labor:

Considering current knowledge on the dynamics of childbirth, especially of uterine physiology, the resources that the modern medications which have enriched the ‘obstetrics arsenal’ arsenal are capable of providing ..., it is imperative that today’s obstetricians abandon their attitude of extreme passivity in the face of normal labor (Ribeiro, 1962, p.103; emphasis added).

In her study on obstetrics in Brazil at the turn of the twentieth century, Ana Paula Martins (2004) notes that there was no interventionist guidance among the main schools of obstetrics in the country at that time. Rather there was a sort of “armed expectation,” as tools and techniques that allowed intervention in complicated deliveries became known and reasonably put into practice, although this was not based on the belief that the technology was supreme or the obstetrician dexterous. But during the period under study in this present study, we can see how such conceptions of obstetrics begin to be modified. The following excerpt by the obstetrician Francisco Greele defends and justifies the interventionist stance, exposing the opposition between the “passivity” (linked to “backwardness”) and “activity” (linked to “advance,” “modernity,” and “scientific nature”) of the obstetrician in labor care. What is being argued is a greater role for the obstetrician, who is expected to lead and command labor:

In obstetrics today, leading labor expresses the antithesis of traditional orientation. Here an attitude of absolute abstention used to dominate, at the mercy of the empiricism of its concepts. The amniotic sac was 'respected,' considered to be the central point of the mechanism of dilation, spontaneous expulsion of the fetus 'was awaited,' the inevitability of pain 'was expected,' the perineum was defended, and intervention during placental expulsion was feared, since infection took a heavy toll. When the traditional myths were demolished and its concepts were based on physiology, greater importance was lent to the psychological component of the woman, ruling out the restrictions imposed by the specter of infection, pressing the modern school of obstetrics into healthy activism during the childbirth process. The obstetrician, who used to be a 'mere spectator,' 'took the reins,' now conducting and guiding the magnificent functional device with which nature endowed women, and not satisfied in 'commanding' delivery, overturned yet another taboo by taking the initiative to unleash it in the most complete manner of guidance, induction (Greele, 1961, p.96; emphasis in the original).

Meanwhile, the minority condemning birth interventions (especially the use of oxytocics to accelerate or induce labor) most commonly argued that they embodied a dangerous attitude that only addressed the convenience of the obstetric physician, as illustrated in the excerpts below from two different articles:

The acceleration of labor that progresses normally, without complications, only for the convenience of the attending staff, is not justified. We refer to the use of oxytocic drugs of any kind for this purpose (Novis, 1957, p.1015).

In the United States, certain obstetricians gather all their patients who are about to give birth and induce labor early so they are not deprived of excursions, fishing trips, travel, and their own weekend pleasures. And so the pregnant women are meekly hospitalized in larger or smaller batches to be subjected to the unprecedented violence of an extemporaneous delivery, only so that their obstetrician can enjoy the delights of the weekend!

From a technical point of view, this conduct could be censured as a result of possible errors in the calculating the stage of gestation, and could result in premature birth, which will culminate in the loss of fetal life because of precarious resistance to the adverse conditions of the environment.

It is also objectionable from an ethical point of view, because such conduct cannot be justified for futile reasons, for the inferior concerns of the obstetrician, his comfort, convenience, not to miss joyous weekends (Correa, 1955, p.26).

The obstetrician Clovis Correa (1955, p.26) continues his argument by stating that the interests of the laboring woman must take precedence over all others, and that, "In this order of ideas, we could justify cesarean sections because the obstetrician is weary from other commitments or feeling bored." Intervening in labor to accelerate or anticipate it for "futile" reasons (i.e., those not linked to the needs of the laboring woman) was criticized by "abstentionists." Correa was one of the main defenders of the abstentionist train of thought; at the time he was known for defending what he called "naturalization" of childbirth, criticizing the everyday use of interventions such as forceps, for example (Correa, 1924).

Among the doctors favoring the "activist" model, especially with regard to the use of interventions such as oxytocin to accelerate or induce labor, there were also concerns with

defending the model against the argument that labor was a physiological and natural event and therefore did not require interventions. For example, Adeodato Filho et al. stated that even though delivery is a physiological event, it is a “*sui generis*” physiological activity, and therefore:

Even within the strictest limits of normality, subjects the woman to suffering and trauma that cannot be disregarded; it ‘so often is diverted from normal,’ subjected to so many and so frequent complications, which ‘in itself constitute a risk’ (Adeodato Filho et al., 1963, p.2-3; emphasis added).

The authors follow this argument in favor of intervention, comparing birth to diseases like cancer and tuberculosis: “Diseases usually considered serious can also be healed by the forces of nature; like tuberculosis, typhus, and more rarely even cancer; but they do not consequently cease to be diseases” (Adeodato Filho et al., 1963, p.3-4). Therefore, what these authors advocate is, in the words of Ferraz (1957, p.101): “The abandonment of this passive attitude to progress in childbirth, exclusively subject to the determinism of nature, seeking to shorten it by ... wise implementation of the most varied therapeutic resources.”

Although the goal was to shatter passivity and dominate nature, the argument used was that synthetic oxytocin, or Pitocin, could “imitate nature,” (re)producing uterine contractions of normal delivery:

Oxytocin, administered intravenously in a continuous manner and at appropriate doses, ‘can reproduce the uterine contractility of normal delivery,’ and preparations containing the purest oxytocin possible should be utilized (Andrade et al., 1966, p.282; emphasis added).

In using a concentrated and rapidly perfused oxytocin solution, we attempt to ‘imitate nature, provoking identical contractions’ to those which expel and accelerate delivery (Silveira et al., 1965, p.65; emphasis added).

‘Pitocin only simulates or imitates what nature does’ during the mechanism of normal labor (Soichet, 1956, p.164; emphasis added).

If, for some, the nature of childbirth is *sui generis*, justifying medical intervention, for others it is similarly a phenomenon “full of paradoxes and contradictions:”

In fact the act of childbirth is a ‘mysterious phenomenon full of paradoxes and contradictions.’ Childbirth occurs by the grace of God, stated the ancients, with, without, and in spite of any assistance: but without this peculiar grace it simply does not happen. Furthermore, one can also die from childbirth. Many other times, it is true, it is completed ‘although at the cost of great suffering. Delivery is sometimes fast, sometimes slow, tedious, and distressing, constituting a trance that requires aid and relief’ (Lima, Kamnitzer, 1965, p.216; emphasis added).

The rationale for interventions therefore stems from the unpredictable nature of childbirth – sometimes fast, sometimes slow, sometimes “by the grace of God” and sometimes not. However, what is “predictable” in birth is pain and suffering for the laboring mother, and more rapid delivery supported through interventions is the solution:

But it is the pain that dominates, perturbs, and terrifies. Hence the concern with fast delivery. ‘Faster delivery equals less pain or suffering,’ and above all it is convenient

and comfortable for the obstetrician, and also promises better prospects for the fetus (Lima, Kamnitzer, 1965, p.217; emphasis added).

Accelerating delivery and simultaneously making it less painful or even painless is the founding principle of good obstetrics (p.220).

In this way, interventions to speed childbirth were seen as the duty of the obstetrician, “shortening the suffering” of the mother. As stated by Rocco (1957, p.91-92), the purpose of the obstetrician was “achieve a delivery that is always faster and painless, without problems from excessively rapid labor.” The excerpts below reinforce this idea:

Delivery, by its nature, is long and exhausting, and has always been a concern of obstetrics, therefore making it shorter and more bearable for the laboring woman is our main goal (Ferraz, 1957, p.101).

Guiding delivery, shortening its duration, and bringing it to a happy conclusion has always been the major ambition of the obstetrician (Bastos Filho, 1962, p.155).

Martins et al., in a 1977 article, go even further, saying that it is unacceptable for childbirth to progress “as it pleases:”

It is no longer possible for childbirth to be painful and ‘progress as it pleases.’ The obstetrician’s interference in labor today is an ‘obligation,’ and even more, ‘a duty.’ Childbirth cannot and should not progress without the guidance of an obstetrician attempting to lessen pain, shorten labor, correct abnormalities, and provide support and psychological assistance to laboring mothers (Martins et al., 1977, p.132; emphasis added).

The quotes above show that during the period analyzed, a new model of obstetric care (namely, with the physician assuming greater centrality and greater use of interventions in childbirth) began to be widely advocated and propagated in the major Brazilian journals in this area.

### **Oxytocin: one link in a “chain of interventions”**

It is important to highlight that the use of oxytocin cannot be separated from other interventions in childbirth, since its use in narco-acceleration is associated with a series of interventions (some more directly linked to oxytocin, others less so) which were described in detail in the articles analyzed, starting with “intestinal cleansing, trichotomy [shaving of the pubic hair], and antisepsis of the external genital organs” (Ribeiro, 1962). Increased monitoring of the pregnant woman and fetus also were prescribed, and fetal heartbeat was to be checked frequently with the Pinard stethoscope. Furthermore, the authors affirmed the need to regularly assess progress in cervical dilation through vaginal or rectal examinations, and routine administration of oxygen to prevent fetal anoxia during labor.

The amniotic sac was seen as a “hindrance to the smooth progress of childbirth” (Ribeiro, 1962), to be broken by the obstetrician (in a procedure known as amniotomy) to accelerate delivery. As can be seen below, this was yet another way to intervene in the birth process and increase the active role of the obstetrician:

Early artificial rupture of the membranes is routine in any labor planning. In doing so, 'we take the initiative' in the labor process, precipitating the appearance of physiological moments of myometrial activity, which otherwise would take place with 'undesirable natural slowness' (Greele, 1961, p.97; highlights ours).

As for positioning the woman to give birth, 'lithotomy' (lying belly-up, with legs open and flexed) was preferable because: "it widens and better exposes the perineum and gives 'the doctor freedom of movement.' It facilitates local infiltration of anesthesia, as well as episiotomy and its suture" (Adeodato Filho et al., 1963, p.11; emphasis added). It should be noted that greater freedom of movement for the doctor, in this case, necessarily opposed the laboring mother's freedom of movement. Therefore, like Emily Martin (2006), we see that the physician increasingly interfered in labor with the use of different techniques and technologies. At the same time, the woman was relegated to the background and seen as possessing a "machine" that was to be "repaired" or "improved" by the obstetrician. One drawback of accelerating labor with oxytocin is an increase in pain, which in turn could be reduced with the use of anesthetics. In the words of Lima and Kamnitzer (1965, p.217): "Hence the apparent need to associate oxytocics and anesthetics; one for the complementary action of the other."

Episiotomy was widely defended among the authors analyzed, and was indicated for all primiparous women and multiparous women who had episiotomy in previous deliveries. It was considered a "pacifying stitch:"

Fortunately, its [episiotomy] use is increasingly growing. The classic and obsolete maneuvers to 'protect the perineum' now give way to the wider practice of episiotomy. We will not expound considerations on the subject, which currently seems to be a pacifying stitch. Instead we will say that it has a dual purpose: faster completion of labor, sparing the fetus pointless and dangerous trauma and permitting better restoration of the soft parts for the woman, which is very important for the future of the woman (Ribeiro, 1962, p.110-111; emphasis in the original).

Another widespread practice mentioned in the texts was the Kristeller maneuver, in which the obstetrician or an assistant applies force to the woman's belly during uterine contraction. The Kristeller maneuver was especially recommended in cases where the anesthetized mother consequently required "complementation of her expulsive efforts" (Silveira et al., 1965, p.63).

## Final considerations

In conclusion, in this article we sought to reflect on the "social life" of synthetic oxytocin; in other words, its synthesis, stabilization, and use in obstetrics to accelerate delivery. We understand oxytocin to be simultaneously semiotic and material, linking conceptions of gender and the female body. We argue that far from envisaging its use as an isolated intervention, we should connect this technology to other obstetric means of acting during birth, more broadly reflecting on the process of medicalization. In this way, analysis of oxytocin allowed us to reflect on the expansion of medical interventions in childbirth over the period studied.



As Oudshoorn states (2004), in considering the heterogeneous networks surrounding new technologies, we must not forget the fundamental cultural norms and values to ensure relations between the elements of these networks. Therefore, by investigating the use of oxytocin from the late 1950s in Brazil, we also were interested in analyzing discourse by obstetricians at the time who defended an “interventionist” and “activist” posture in childbirth, which they considered more “modern.” In this sense, it is interesting to observe how the recommendation of a more “active” posture for the doctor required a contrastingly greater passivity on the part of the laboring mother with regard to the use of more interventions and increased medical monitoring. A good example is the recommendation that pregnant women give birth in the lithotomy position so that “the doctor” could have greater visibility and freedom of movement.

In this way, from the late 1950s and especially the 1960s we can see growing recommendations that the obstetrician be the central figure, as well as the cascade of different interventions aimed to shorten labor. Furthermore, the very notion of the obstetrician’s central role was questioned and resignified: since delivery was seen as potentially dangerous, unpredictable, and always causing pain and suffering to the laboring mother, the best solution was to shorten it and make it as quick and as painless as possible, primarily by combining synthetic oxytocin and anesthesia. Finally, new definitions of normal childbirth were defined during this period (particularly in the studies by the physicians Caldeyro-Barcia and Alvarez), mainly with respect to the ideal duration of labor. Other ideas related to oxytocin that circulated during the period under study, like the possibility of induction with oxytocin to achieve “scheduled childbirth” (Paciornik, 1961), did not have the same repercussion as acceleration of labor. In this sense, shortening delivery imposed a new normality on the birth process, but did not stop its spontaneous initiation.

Our goal in this study was to shed light on the process of assimilating oxytocin into childbirth assistance, and its role (alongside other interventions) in what has been called the “cascade effect” (Diniz, Chacham, 2006). The succession of routine interventions – trichotomy, enema, episiotomy, and oxytocin – has been questioned, particularly in the movement towards humanized childbirth, which has brought discussions on sexual and reproductive rights to the forefront, along with women’s bodily autonomy in childbirth (Tornquist, 2004; Carneiro, 2011). By analyzing the arguments that accompanied the arrival of synthetic oxytocin in Brazil, we found that narco-acceleration did not correspond to the interests of laboring mothers, instead only bolstering the active positioning of the obstetrician before delivery, a process which was already underway. By reflecting on the arrival of this feature in childbirth assistance, we hope that new questions may arise with regard to the objects that brought about interventions and the process of medicalization of childbirth.

## NOTES

<sup>1</sup> For discussion on cesarean sections in Brazil, see Nakano, Bonan, and Teixeira (2015).

<sup>2</sup> Oxytocin is the main substance with oxytocic properties used in childbirth, but is not the only one. In the journals analyzed, we found various reports indicating the use of “rye ergot” extracts since the

eighteenth century; this parasitic fungus that attacks the rye plant is rich in alkaloids. The articles stated it was considered by some to be an “old brew of renegade memory” (Lima, 1962, p.13) for containing toxic substances. Later, in the mid-1950s, ergotamine and ergonovine were discovered in rye ergot, followed by the development of methyl-ergonovine, which is still used today in obstetrics during the third stage of labor to expel the placenta.

<sup>3</sup> In this and other citations of texts from Portuguese, a free translation has been provided.

<sup>4</sup> Du Vigneaud began his work investigating not oxytocin but rather insulin, thirty years before at the University of Illinois. His work with insulin sparked his interest in other hormones, and there were indications in the literature that like insulin, oxytocin was a polypeptide (i.e., composed of a chain of multiple amino acids), which also contained sulfur in its composition. In 1932 he began his preliminary exploration using the same technique he used previously with insulin (Du Vigneaud, 1956).

<sup>5</sup> For example, see Du Vigneaud et al. (1953a, 1953b) and Du Vigneaud (1956).

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