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Induced lactation in a transgender woman: case report

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Abstract

Background Breastfeeding offers significant health benefits, but its practice and success can vary. While research on induced lactation in cisgender women has been documented, there is limited research on lactation induction in transgender women.

Case presentation A 50-year-old transgender woman undergoing hormone therapy and living with a pregnant partner sought to co-feed using induced lactation. After approval by the hospital ethics committee, a regimen of estradiol, progesterone, and domperidone was initiated, accompanied by nipple stimulation. Lactation was successfully induced and maintained, with milk composition analysis indicating high levels of protein and other key nutrients. This case, the seventh reported, highlights the complexity of lactation induction in transgender women, considering factors such as age, obesity, and insulin resistance. The nutrient profile of the milk suggests its suitability for infant feeding, despite some differences from typical human milk.

Conclusions Induced lactation is feasible in transgender women, expanding the understanding of non-puerperal lactation and its potential in diverse family structures. Further research is warranted to optimize lactation induction protocols in transgender women.

Keywords Breastfeeding, Lactation induction, Transgender, Transgender woman, Gender-affirming

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Background

Breastfeeding provides many physical and psychological health benefits for mother, infant and family. In addition to the macronutrients and energy needed for growth, breast milk contains a variety of bioactive components, such as immune proteins, growth factors, metabolic hormones, and oligosaccharides, that contribute to immune maturation and organ development. The World Health Organization and national organizations in various countries recommend exclusive breastfeeding for 6 months [1], and although many families prefer to breastfeed, the amount of breast milk varies from person to person. Breastfeeding is thought to have immunological and metabolic benefits for both mother and infant, as well as psychological and social benefits. Breast milk contains secretory immunoglobulin A (sIgA), anti-inflammatory agents, and other immunomodulators, and breastfed infants have improved immunological function compared with formula-fed infants [2]. There have been recent reports of lactogenesis in cisgender women who have had children through adoption or surrogacy [3–5]. Transgender women may also wish to breastfeed after having children through adoption or birth by a cisgender female partner. However, to our knowledge, there are only six case reports [6–11] in the literature of studies of induced lactation in transgender women. In this report, we present a case report of successful lactation induction and direct breastfeeding by a transgender woman.

A 50-year-old transgender woman came to our hospital wanting to co-feed with her own milk. She lived in Japan with her pregnant partner. At presentation, her cisgender female partner (in her 30s) was in her 19th week of pregnancy, conceived by sperm donation. The ethics committee of our hospital discussed the risks and decided to proceed with the procedure after obtaining approval (approval number: L08-05). Physical examination revealed that the transgender woman was 188 cm tall, weighed 152 kg (body mass index 43), and had Tanner stage V breasts. The patient started hormone therapy at age 40 and was taking estradiol 6 mg/day. She underwent orchiectomy at age 44 and had a history of dyslipidemia for which she was taking 10 mg atorvastatin. The patient had no history of smoking and only drank alcohol occasionally. At the time of the initial visit, the patient was an exuberant, well-nourished, physically and mentally healthy woman who looked her age. Tests for human immunodeficiency virus and T-cell lymphotropic virus-1 were both negative. Electrocardiography and venous ultrasonography were within normal limits, with no arrhythmias or obvious thrombotic findings. Blood test results were as follows: 8,600/mm^3 white blood count, 15.7 g/dL hemoglobin, 48% hematocrit, 160,000/mm^3 platelets, 38 mg/dL high density lipoprotein cholesterol, 68 mg/dL low density lipoprotein cholesterol, 188 mg/dL triglycerides, 6 g/dL total protein, 33 U/L aspartate aminotransferase, 32 U/L alanine aminotransferase, 86 mg/dL glucose, 5.7% glycated hemoglobin, homeostasis model assessment-insulin resistance = 34.52, 200 pg/mL estradiol, 0.22 ng/mL progesterone, 0.03 ng/mL total testosterone, 1.12 mg/dL creatinine, 14.9 ng/mL prolactin, 2.5 mIU/mL luteinizing hormone, and 2.9 mIU/mL follicle stimulating hormone. The transgender woman on estradiol treatment had hormone levels (E2, progesterone, prolactin) in the cisgender female reference range (Table 1) and no apparent organ damage, but exhibited elevated homeostasis model assessment-insulin resistance and insulin resistance.

Table 1 Blood hormone results prior to treatment

	This case	Cisgender female reference range (nongravid)
Estradiol	200 pg/mL	30–500 pg/ml
Progesterone	0.22 ng/mL	< 10 ng/ml
Prolactin	14.9 ng/mL	15 ng/ml

Results

Following known articles for induction of lactation [6–11], the patient was initially treated with 6 mg estradiol and 10 mg domperidone. There are no guidelines for induced lactation in transgender women, so we increased the hormone dosage based on periodic blood tests and patient symptoms. At the time of the treatment of the current patient, there had only been two previous transgender breastfeeding papers [6, 7]. Therefore, although estradiol, progesterone, and prolactin were monitored with reference values, it was difficult to evaluate the test results. Because of concerns regarding leg vein thrombosis associated with high-dose estrogen, and arrhythmia and dyskinesia associated with high-dose domperidone, the lower extremities were carefully visually inspected and examined neurologically, and ECG was regularly monitored. Blood tests were performed as an adjunct to screen for thrombosis by measuring D-dimer.

On day 39 of treatment, 100 mg progesterone was started, and on day 46, nipple stimulation (four times/day) with a breast pump was started along with 6 mg estrogen, 100 mg progesterone, and 30 mg domperidone. A midwife provided in-person and online guidance on how to promote lactation. On day 53, progesterone was increased to 200 mg, and on day 59, progesterone (300 mg) and domperidone (60 mg) were increased, and estradiol (6 mg) was continued. On day 63, in addition to 6 mg estradiol, 1 mg estradiol gel was added with 500 mg progesterone and 60 mg domperidone, and lactation was observed on the same day. After lactation was confirmed, the frequency of pumping was increased

from four to six times/day, and on day 99, the total estrogen dose was increased to 8 mg (6 mg oral+2 mg gel). Transdermal estrogen administration was added to bring the estrogen concentration closer to that of the gestational age. Considering age and other factors, the risk of estradiol-induced venous thromboembolism was considered high, and transdermal rather than oral agents were chosen for estrogen administration, as recommended in the guidelines [12]. The initial milk production was only a few drops. Subsequently, 8 mg estradiol, 500 mg progesterone, and 80 mg domperidone were administered to continue pseudo-gestation. We did not increase estrogen and progesterone levels to gestational and postpartum levels because of the risk of venous thromboembolism, and because milk production was observed, the levels of estrogen and progesterone were simply maintained. According to reference literature on induced breast milk [13], the maximum dosage of domperidone was 80 mg/day. Therefore, initial treatment was domperidone at 10 mg/day, with the dosage increased according to the patient's physical condition. One paper on induced breast milk in transgender women reported prolactin levels above 100 ng/mL [6], so we adjusted the domperidone dosage to maintain prolactin levels above 100 ng/mL. Because the patient needed to be in a pseudo-postpartum state, progesterone was discontinued on day 123 of treatment and the estrogen dose was reduced to 4 mg. Domperidone (80 mg) was continued to maintain hyperprolactinemia. After day 123, as progesterone and estrogen levels decreased, milk secretion increased, as physiologically is the case with milk secretion during the postpartum period, with approximately about 30 ml of milk per day.

There is no protocol for inducing lactation in transgender women, but protocols for inducing lactation in cisgender women are well known. For example, the Newman-Goldfarb protocol aims to simulate the hormonal fluctuations of pregnancy and prepare the breasts for lactation [13]. This protocol involves increasing prolactin levels with a galactagogue, while concurrently raising progesterone and estrogen levels, followed by a decrease in the latter two during the postpartum period. Estrogen, progesterone, and domperidone levels were adjusted based on this protocol to achieve blood levels ranging from high estrogen, high progesterone, and high prolactin (pseudo-pregnancy) to low estrogen, low progesterone, and high prolactin (pseudo-postpartum state) (Fig. 1).

On day 146, her partner delivered and the patient was able to directly breastfeed the baby. After consultation with the patient, domperidone was tapered and breastfeeding was discontinued on day 237, 3 months after delivery. The breastfeeding period was physically and psychologically taxing for the patient because of the ongoing hypoestrogenic and hyperprolactinemia associated with drug adjustments. Considering the patient's

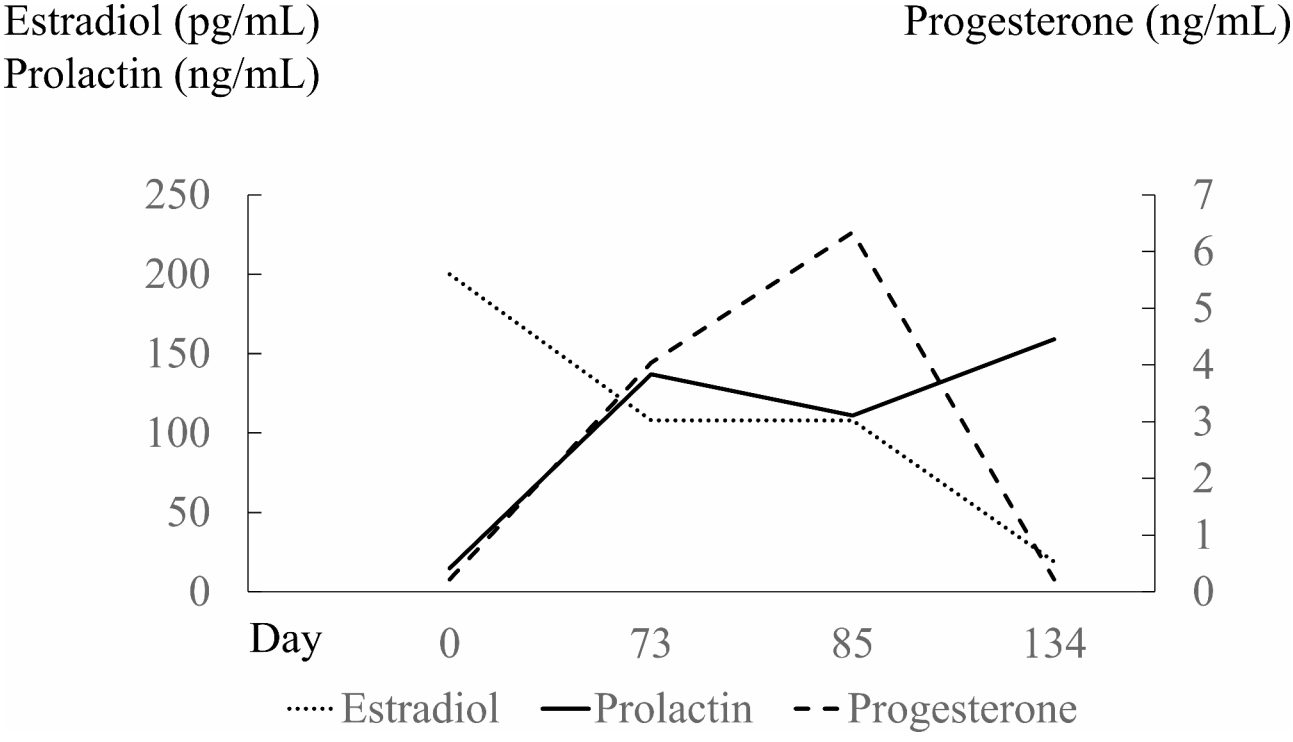

Fig. 1 Changes in hormone levels during treatment
The levels of progesterone, estradiol, prolactin, and testosterone in blood were measured on days 0, 73, 85, and 135 of treatment

age, health, and the burden of raising a newborn, breastfeeding was discontinued. The results of the child's blood tests at 3 months of age showed no obvious abnormalities and her growth was within the normal range.

Results of analysis of milk composition are shown in Table 2. Protein in the breast milk composition was very high at 123 and 126 days after the start of treatment. The sIgA and lactoferrin levels were high, and calcium and zinc levels were comparable with normal breast milk, but phosphorus levels were low. Breast milk composition at 199 and 215 days of treatment was considered equivalent to that of 7–8 months of gestation and within the normal range compared with known milk data from preterm infants [14, 15]. Note that the results of these measurements were based on 1 day of milk, rather than a session, given the small volume of lactation per session.

Discussion

This is the seventh case reported in the literature [6–11] of a transgender woman successfully breastfeeding, with lactation induction observed 63 days after initiation of hormone therapy. To induce non-gestational lactation, it was necessary to create a pseudo-gestational state with high estrogen, high progesterone, and high prolactin, followed by a pseudo-puerperal state created by rapid reduction of estrogen and progesterone while maintaining a high prolactin state [6, 7]. For the current case, lactation resulted from treatment with the previously reported dose of domperidone (60 mg/day)[7], but the amount of lactation was smaller than amounts described in other cases. Previously reported cases of transgender women exhibited lactation of 240 mL/day [6–9], whereas lactation in the present case was only about 30 mL per day. Known reasons for delayed/poor lactation include age and obesity [16]. The current patient was older, obese, and had high insulin resistance, which may have contributed to delayed/poor lactation. Other reports did not mention the body mass index. The current patient was in her 50s, which is older than other cases. It has been suggested that obesity may increase insulin resistance, resulting in delayed induction of lactation [17, 18], although the mechanism is still unclear.

Table 2 Breast milk composition results

Day of treatment	123	126	199	215
Lipid (g/dL)	2.5	3.4	1.9	-
Protein (g/dL)	4.4	4.0	2.0	-
Carbohydrate (g/dL)	4.2	4.0	4.3	-
Energy (kcal/dL)	59	65	43	-
Lactoferrin (μg/mL)	14,979	14,979	4729	6267
sIgA (μg/mL)	57,873	43,259	16,160	21,751
Ca (mg/dL)	18.4	17.1	13	12.7
IP (mg/dL)	0.3	0.6	0.1	0.2
Zn (μg/dL)	144	112	16	18

sIgA; secretory immunoglobulin A

IP; inorganic phosphorus

Domperidone has side effects, such as ventricular arrhythmias (QTc prolongation syndrome), so the dose used in the current case was carefully increased with prior ECG testing. There were no side effects (e.g., arrhythmia and dyskinesia) and no complications observed during treatment with domperidone. Less than 0.1% of the domperidone dose is excreted in breast milk, and there have been no reports of adverse reactions in nursing infants of patients taking domperidone [19]. Oral administration of domperidone during lactation has been approved by the American Academy of Pediatrics and the Canadian Insurance Code.

Breast pumping and nipple stimulation were performed six times a day (10 min on each side), which is thought to increase prolactin and oxytocin levels and lead to milk let-down [20]. Milk tested 4–5 months (16–19 weeks of gestation) after the start of pseudo-gestational therapy was likely equivalent to milk of women at less than 22 weeks gestation. To our knowledge, the normal range of breast milk from women under 22 weeks of gestation is unknown, making it difficult to assess whether the results in this case were within the normal range. However, breast milk from women with preterm infants has been reported to have higher protein levels than those at term [5, 14, 15], so it is possible that the protein content in the current case may be appropriate for breast milk at less than 22 weeks of gestation (which may have extremely high protein levels). Multiple pregnancy, parity, child's sex, and neonatal birthweight are all possible factors contributing to a different composition of breast milk in women that do not apply to a transgender woman. Age, diabetes, and obesity may impact transgender women in similar or different ways depending on how they modulate milk composition.

Immune components in human milk, such as sIgA and lactoferrin, strengthen the immune system of newborns and reduce preterm birth complications. Lactoferrin is an iron-binding glycoprotein that has antibacterial, antiviral, and anti-inflammatory properties, and enhances host defense by sequestering iron required for bacterial growth. A recent systematic review and meta-analysis of nine randomized controlled trials reported that prophylactic lactoferrin significantly reduced the incidence of necrotizing enterocolitis and late sepsis in preterm infants [21]. Although there are no known reports of normal levels of sIgA or lactoferrin in very preterm infants, previous reports showed that mean concentrations of sIgA and lactoferrin were inversely correlated with lactation [22]. Therefore, it has been suggested that the increase in sIgA and lactoferrin concentrations with gestational age may be due to differences in lactation between patients with preterm and term infant[14].

The older patient, in this case, was had a low volume of milk and we suspect that the levels of sIgA and lactoferrin were very high. Because sIgA and lactoferrin levels have a positive influence on the immune development of newborns, breast milk with high levels of these immune substances will be considered important for the future well-being of offspring. In addition, milk from the current case had normal levels of calcium and zinc, although phosphorus levels were low compared with normal breast milk [23]. Given the importance of calcium and phosphorus in bone formation, further research is needed to clarify the reasons for low phosphorus levels and conditions that show a positive correlation with phosphorus levels. Breastfeeding is thought to promote parent-child bonding, and studies of induced lactation in non-gestational parents are underway. Similar research for transgender women is expected to increase in the future.

In this study, we proceeded with lactation induction in a transgender woman through periodic blood tests and with reference to known articles [6, 7]. Given the lack of guidelines for breastfeeding in transgender women, it is unclear whether the patient's hormone levels were adequate to reach the level of lactation. Further research is needed to determine the optimal regimen of appropriate drug dosage and pumping frequency for lactation induction.

Lactation induction in transgender women is feasible. Further research is needed on non-puerperal lactation given the increasing diversity of partnering patterns.

Methods

Measurement of Breastfeeding milk Components. Lipids, protein (crude protein), carbohydrates, and energy were analyzed using the Miris Human Milk Analyzer.

Concentrations of sIgA and lactoferrin, major immune components, were determined by enzyme-linked immunosorbent assay (ELISA), and minerals (calcium, phosphorus, and zinc) were determined by enzymatic methods.

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Author contributions
Conceived and designed the experiments: S.I., M.T., K.M. Performed the experiments: S.I., M.T., M.K., N.N., Y.K., K.M.Analyzed the data: S.I., M.T., M.D., S.T., H.W., M.M., T.K., M.O., K.M. Supervised the study and manuscript drafting: S.I., M.T., M.M., T.K., D.S., N.S., A.S., M.N., H.G., K.M. Wrote the paper: S.I. All of the authors critically revised this manuscript for important intellectual content and approved the fnal version submitted for publication.All individuals who meet the criteria for authorship are listed as authors. Each author certifies that he or she has made a substantial contribution to the work and accepts public responsibility for its content, including participation in its conception, design, interpretation, writing, or revision.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
Written informed consent for this study was obtained from the patient. The ethics committee of our hospital discussed the risks and decided to proceed with the procedure after obtaining approval (approval number: L08-05). This study was implemented in accordance with the provisions of the Declaration of Helsinki.

Consent for publication
Written informed consent for publication has been obtained.

Competing interests
The authors declare no competing interests.

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