Dokkyo Medical Journal
1(1): 72-75, 2022

DKMJ

Case Report

# A Case of Premature Constriction of the Ductus Arteriosus in an Infant Caused by Intake of Rooibos Tea during Pregnancy

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**Summary**

Rooibos tea is rich in a variety of polyphenols and is used for its anti-inflammatory and caffeine-free properties by women during pregnancy. However, a relationship between polyphenols and premature constriction of the ductus arteriosus (PCDA) has also been suggested. We experienced a case of PCDA in an infant whose mother began to drink Rooibos tea every day in the 26th week of pregnancy. The infant was a male with a birth weight of 3,099 g at gestational age of 36 weeks and 5 days. The infant was delivered by emergency Cesarean section due to placental dysfunction, and the Apgar score was 8/9. Respiratory distress was observed after birth and ductus arteriosus closure was confirmed by echocardiography; therefore, the infant was diagnosed with PCDA. His symptoms improved after oxygen supply and administration of furosemide and dobutamine, and he was discharged from hospital at age 26 days under home oxygen therapy. This case indicates the need to disseminate information on the possibility that PCDA may develop in newborn infants when their mothers drink Rooibos tea during pregnancy.

**Key Words**: Premature constriction of the ductus arteriosus, Polyphenol, Rooibos tea

## Introduction

Rooibos tea is rich in a variety of polyphenols and is drunk by women during pregnancy because of its anti-inflammatory and antioxidant actions, which improve immunity, edema, and constipation, and its caffeine-free property. However, excessive ingestion of polyphenols during pregnancy may be a cause of premature constriction of the ductus arteriosus (PCDA), which can also be induced by agents such as non-steroidal anti-inflammatory drugs (NSAIDs) or may be idiopathic. Here, we report a case in which PCDA was identified late in pregnancy, where the ingestion of Rooibos tea during pregnancy was discovered through a detailed interview, and PCDA was observed in the infant after birth. This case is reported after consent was obtained from the parents of the infant.

Received September 9, 2021; accepted September 30, 2021
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## Case Presentation

The patient was a 0-day-old boy born to a 29-year-old woman, gravida 2 para 0 who had become pregnant naturally. She had no history of taking oral NSAIDs during pregnancy, but she had ingested about 500 mL of Rooibos tea daily from about 26 weeks of gestation. She was referred and admitted to the obstetrics and gynecology department of our hospital at 34 weeks of gestation for threatened premature delivery

**Table 1** Laboratory test findings on admission

| | | | | | |
|---|---|---|---|---|---|
| Blood count | | ALP | 917 U/L | CK | 186 U/L |
| WBC | 11,900 $10^3$/μL | LDH | 327 U/L | CRP | < 0.06 mg/dL |
| Neu | 44 % | T-bil | 1.84 mg/dL | | |
| Lym | 39 % | D-bil | 0.15 mg/dL | Blood gas analysis | |
| Mon | 6 % | TP | 4.6 g/dL | pH | 7.171 |
| Eos | 8 % | Alb | 3.04 g/dL | $PCO_2$ | 67.7 mmHg |
| Hb | 17.9 g/dL | BUN | 7 mg/dL | BE | -4.3 mmol/L |
| Hct | 51.7 % | Cre | 0.61 mg/dL | $HCO_3$ | 24.2 mmol/L |
| Plt | 20.5 $10^4$/μL | Na | 141 mEq/L | Lactic acid | 22.9 mg/dL |
| | | K | 4.3 mEq/L | | |
| Biochemistry | | Cl | 107 mEq/L | BNP | 286 pg/mL |
| AST | 20 U/L | Ca | 9.2 mg/dL | NTproBNP | 5,400 pg/mL |
| ALT | 12 U/L | IP | 5.4 mg/dL | | |
| | | UA | 4.4 mg/dL | | |
| | | Glu | 30 mg/dL | | |

and suspected PCDA, right heart failure, and fetal pleural effusion. The symptoms did not aggravate after admission and the course was followed, but placental dysfunction was suspected at 36 weeks and 5 days of gestation, at which time the patient was delivered by emergency Caesarean section. The Apgar score was 8 and 9 after 1 and 5 minutes, respectively, and the newborn was admitted to the NICU under oxygen administration ($FiO_2$ 0.4).

On NICU admission, the patient had the following characteristics: height, 49.0 cm (± 1.0 SD); body weight, 3,099 g (± 1.3 SD); heart rate, 128/min without irregularity of cardiac rhythm; respiratory rate, 42/min; blood pressure, 72/43 mmHg; $SpO_2$, 97% ($FiO_2$ 0.35). The general condition was stable and vitality was favorable. The anterior fontanel was flat; nasal alar breathing, mild groan, and mild retractive breathing were observed; and heart murmur, hepatosplenomegaly, peripheral coldness, and systemic edema were absent. Laboratory test findings in venous blood gas analysis (room air) were pH 7.171, $PCO_2$ 67.7 mmHg, $HCO_3$ 24.2 mmol/L, BE -4.3 mmol/L, lactic acid 22.9 mg/dL, showing respiratory acidosis. BNP (286 pg/mL, standard: 231.6 ± 197.5 pg/mL) and NT pro BNP (5,400 pg/mL, standard: 1,088 ± 1,010 pg/mL[1]) were both high (Table 1).

On chest plain radiography, the cardiothoracic ratio was 0.648 and right pleural effusion was noted (Fig. 1). Echocardiography showed no structural abnormality. Right heart failure was observed (dilatation of the right side of the heart, thickening of the right ventricular heart muscle, tricuspid regurgitation: estimated pressure difference between the right atrium and right ventricle, 24.7 mmHg). Interatrial communication was noted, left ventricular contraction was favorable, and the ductus arteriosus was closed.

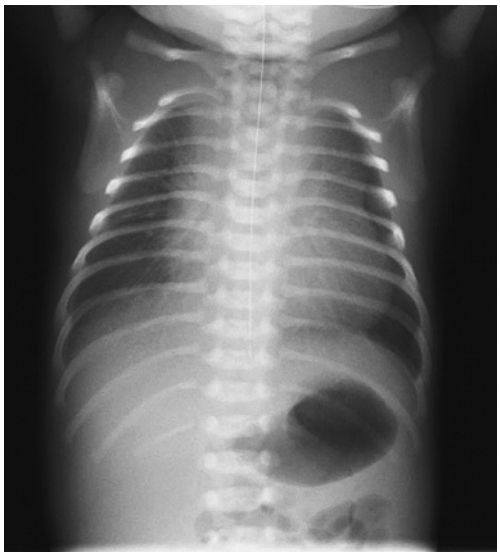

**Figure 1** Chest plain radiography on admission. The cardiothoracic ratio was 0.648 and right pleural effusion was observed.

The baby was admitted to the NICU because polypnoea and retractive breathing were observed immediately after birth, and treatment was initiated with a 6 L/min high flow nasal cannula (HFNC) at $FiO_2$ 0.35. For right heart failure, a 1 mg/kg/dose intravenous in-

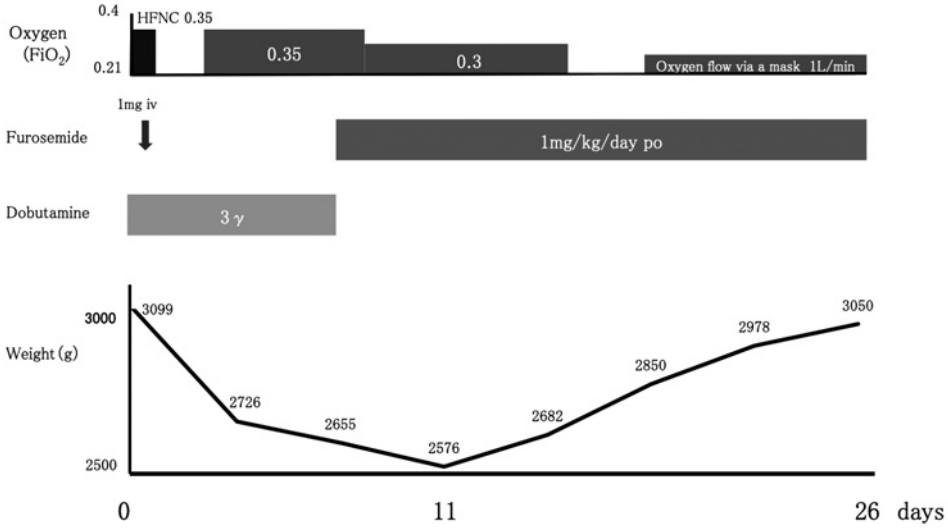


**Figure 2** Course after admission. HFNC: high flow nasal cannula.

jection of furosemide and continuous drip infusion of dobutamine at 3 μg/kg/min were initiated. Since polypnoea and retractive breathing improved 20 hours after birth, the HFNC was withdrawn and changed to an incubator oxygen supply ($FiO_2$ 0.35). On chest plain radiography at 3 days after birth, the cardiothoracic ratio had decreased to 0.49 and reduction of right pleural effusion was noted. Echocardiography showed improvement of tricuspid regurgitation. Dobutamine administration was completed 7 days after birth and oral administration of furosemide was initiated at 1 mg/kg/day.

On echocardiography 10 days after birth, thickening of the right ventricular wall and tricuspid regurgitation had disappeared. The respiratory condition was stable thereafter. The oxygen supply was gradually decreased and ended at 13 days after birth. However, at 17 days after birth, $SpO_2$ was about 94%, showing a tendency for tachypnea, for which the oxygen supply was restarted by oxygen flow via a mask at 1 L/min. No reduction of $SpO_2$ or tendency for tachycardia was noted thereafter. The infant was discharged to home under home oxygen therapy at 26 days after birth (Fig. 2).

## Discussion

In this case, we believe that ingestion of Rooibos tea during pregnancy was the cause of PCDA. Rooibos tea contains many polyphenols and is considered to have antiaging and skin-beautifying effects, as well as improving edema and coldness. It is also caffeine-free and is thought to be beneficial in pregnancy. However, an association of PCDA with polyphenols in foods and drinks ingested during pregnancy has recently been suggested[2-7]. PCDA may be idiopathic[8] or drug-induced[2,3], and cases of PCDA caused by NSAIDs taken during pregnancy have often been reported since about 1980. These drugs inhibit cyclooxygenase (COX) and thus reduce synthesis of prostaglandin E2, which plays an important role in dilation of the ductus arteriosus. Therefore, use of NSAIDs is a concern during pregnancy[9].

Polyphenols are components of plants and have a bitter taste. There are about 5,000 different polyphenols, and these compounds have antioxidant, reactive oxygen-scavenging, and antiallergic activities. Polyphenols also inhibit COX, similarly to NSAIDs. Among the COX isoforms, expression of COX-2 increases in late pregnancy and plays an important role in dilation of the ductus arteriosus at this time[10]. The sensitivity of the ductus arteriosus to indomethacin, a COX inhibitor, changes with weeks of gestation, with sensitivities of 5-10% before 27 weeks of gestation, 15-20% at 27-31 weeks of gestation, 50% at 32 weeks of gestation, and almost 100% at 34 weeks of gestation and thereafter, suggesting that this later period is the main concern. There is no specific criterion with regard to the safe amount of polyphenols that can be ingested during pregnancy, but the amount ingested by the mother in cases of PCDA has been reported to be 200-780 mg/

day[3,5]. In the present case, the mother ingested 500 mL/day of Rooibos tea daily from about 26 weeks of gestation and the polyphenol content was estimated to be 100-200 mg/day. Improvement of symptoms of PCDA after stopping Rooibos tea ingestion has also been reported.

The beneficial health effects of polyphenol-containing drinks have been widely emphasized, but there is a mistaken perception of the safety of these drinks during pregnancy, including among medical workers. If PCDA is suspected, it is important to perform a detailed interview of the pregnant woman to determine favorite foods and drinks, as well as history of oral drug treatment, including over-the-counter drugs.

In the case reported here, PCDA developed in late pregnancy and information on drinking of Rooibos tea during pregnancy was obtained in a detailed interview. Herbal tea, including Rooibos tea, is considered to be safe and beneficial during pregnancy, but excess ingestion may cause PCDA, and this possibility requires further attention.

## Conflict of interest

The authors declare no conflict of interests.

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