

A new technique using a rubber balloon in emergency second trimester cerclage for fetal membrane prolapse

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Abstract

Aim: Prolongation of pregnancy in cases of fetal membrane prolapse into the vagina during the second trimester is difficult using conservative therapy. After pushing the membranes back into the cervix, emergency cervical cerclage may be advantageous in improving the neonatal outcome. We have been managing membrane repositioning and emergency cervical cerclage with a technique using a rubber balloon device (known as a '*mini metreu*' in Japan), and we examined the efficacy of this technique in five cases.

Methods: Our management was as follows: Initially, the full bladder technique was attempted under general anesthesia. If this was not effective, amnioreduction was performed by transabdominal amniocentesis. After the membrane repositioning using a *mini metreu*, double suture cervical cerclage (McDonald method + Shirodkar method) was performed.

Results: The diameter of the bulging prolapsed membranes ranged from 30–84 mm, with a mean of 52 mm. Cerclage was successfully performed in all of the five cases. Prolongation of the pregnancy period was from 22–107 days (average; 77.6 ± 28.9 days). In cases 1–4, healthy newborns were delivered, but in case 5 sudden intrauterine fetal death due to umbilical cord complications occurred at 24 weeks of gestation.

Conclusion: It appears that long-term prolongation of pregnancy is possible, when performing membrane repositioning using the *mini metreu* and emergency cervical cerclage for fetal membrane prolapse into the vagina.

Key words: cervical insufficiency, emergency cervical cerclage, fetal membrane prolapse, new technique, threatened premature delivery.

Introduction

When bulging prolapsed membranes develop out of the cervix into the vagina during the second trimester (Fig. 1a,b), in many cases the situation progresses to abortion or premature birth, and neonatal prognosis is poor.^{1–7} Since neonatal prognosis is affected by the number of weeks of gestation, the prolongation of gestation is generally attempted for as long as possible. It is difficult to extend the pregnancy period by conservative therapy, however, and keeping the mother resting in bed for a long time increases the risk of thrombosis and infection. Therefore, it is important to determine whether emergency cervical cerclage can be performed or not, after repositioning the prolapsed fetal membranes.^{8–11} Successful cervical cerclage not only improves neonatal outcome but also gives great merit to the mother. In spite of that, no effective management method has been established yet.¹² We have been dealing with bulging prolapsed membranes using a new method that consists of repositioning the handling a rubber balloon device (called *mini metreu* in Japan; Fig. 2b), and conducting cervical cerclage twice. This method was applied in 5 cases, and the efficacy was examined. (The *mini metreu* is produced by SOFT MEDICAL Co., Ltd., 2-17-11 Yushima Bunkyo Tokyo JAPAN.)

Methods

Preoperative diagnosis and management

The sizes of the dilatation of the internal os and the bulging prolapsed membranes in the vagina are estimated using ultrasonography (Fig. 1a). If chorioamnionitis is present, the prolongation of gestation is difficult. If the infant is developed enough to be managed in the Neonatal Intensive Care Unit (NICU), we deliver the infant, however if chorioamnionitis is found when a fetus is too immature, it can be controlled using sufficient antibiotics and anti-inflammatory agents before surgery.¹³ If chorioamnionitis is not cured, however, our only option is to terminate the pregnancy. Likewise, if a diagnosis of chorioamnionitis is confirmed shortly after the operation, the management depends on gestational weeks and fetal growth. If chorioamnionitis is present in a case of fetal membrane prolapse during the third trimester, we deliver the infant.

Anesthesia

The surgery should be performed under general anesthesia in a *Trendelenburg* position. In lumbar anesthesia, the risk of inducing total spinal paralysis should be considered. Patients are conscious under lumbar anesthesia or epidural anesthesia, a *Trendelenburg* position is very uncomfortable for pregnant women, and fetal membrane prolapse may occur again owing to abdominal pressure. Inhalation anesthetic suppresses uterine contractions.

Repositioning of prolapsed membranes

When the vagina is filled with prolapsed membranes and the cervix is not observable (Fig. 3a), the full bladder technique is tried.^{14–16} When the full bladder technique is ineffective, amnioreduction is performed by amniocentesis. According to our experience, in 22–24 weeks of pregnancy, the aspiration of 250–300 mL of amniotic fluid relaxes the membranes packed densely in the vagina. Part of the collected amniotic fluid is submitted to bacterial culture, and close examination for causative bacteria of intrauterine infection is carried out. A few reports showed that the pregnancy period was successfully prolonged by conducting cervical cerclage after amnioreduction.^{15–18} When tense membranes started to be relaxed, repositioning of the membranes is attempted using the *mini metreu* (Fig. 2b). When a part of the cervix becomes visible, the cervix is picked gently with a pair of (Fig. 2a). While drawing the cervix gently, the membranes are pushed back (Fig. 3b). When the cervix is held at 4 points every 90°, the entire circumference of the cervix can be observed (Fig. 3c).

Cervical cerclage

To avoid the risk of recurring fetal membrane prolapsed from a slight gap, and for possible inhibition of ascending infection after the restructuring of the cervix, it is preferable to perform cervical cerclage twice. The first operation is performed using the McDonald method. After the end of the operation using the McDonald method, the *mini metreu* is left as it is (Fig. 4a). Teflon tape is knotted once only tentatively beforehand for tying the *mini metreu* together (Fig. 3d). From this point in time, the bulging of prolapsed membranes in the vagina will not occur again. Next, the second operation is performed using the Shirodkar method. The final knotting is performed at the time of tying the Teflon tape used in the Shirodkar method. At this time, the operator and the first assistant tie the Teflon tape of the McDonald method and that of the Shirodkar method, respectively, at the same time. The second assistant removes physiological saline from the *mini metreu* slowly, and then, removes the *mini metreu* through the cervix. Simultaneously, the operator and the first assistant tie the Teflon tape more tightly (Fig. 3e,f). The result after the conclusion of the cervical cerclage is shown in Figure 4b.

Results

Summarizing the five cases, the onset time of the bulging prolapsed membranes into the vagina was found from 19 to 23 weeks of gestation, and the operation was performed between 20 and 24 weeks. Estimated fetal body weight was 284–699 g (Table 1). When repositioning, the diameter of the bulging prolapsed membranes was 30–84 mm (average; 52 mm). Chorioamnionitis found in Cases 1–4 was mild. The Case 5 patient completely recovered from postoperative infection, and she was stable without having any uterine contractions. The prolongation period from the membranes prolapse to parturition in cases 1–5 were: 97 days (22 weeks of gestation [wG] to 36 wG), 107 days (23 wG to 38 wG), 73 days (22 wG to 32 wG), 79 days (20 wG to 31 wG), and 32 days (19 wG to 24 wG), respectively. Each of Cases 1–4 delivered a healthy baby. Although the postoperative course of Case 5 was good, she had sudden *in utero* fetal demise that seemed to be attributed to an umbilical cord factor and had a stillbirth at 24 weeks of pregnancy. In the other 4 cases the operation succeeded and the mean prolongation of the pregnancy period was 89.0 ± 15.7 days.

Discussion

There has been no report on the establishment of any effective management method for bulging prolapsed membrane cases in the vagina during the second trimester. According to the review of several reports,¹² management by performing a single suture McDonald cerclage was stated in many papers, when a patient was at 14–24 weeks of gestation with the absence of fetal anomaly, membrane rupture, uterine contraction and chorioamnionitis. Using that method live birth is said to be expected in 23–55% of cases. Althuisius and co-workers¹⁰ concluded in their randomized study that emergency cerclage reduces the risk of preterm delivery before 34 weeks of gestation and that the compound neonatal morbidity in women with cervical incompetence with prolapsed membranes compared with bed rest and antibiotics alone. Daskalakis *et al.*¹¹ reported that an emergency cervical cerclage in women with a dilated cervix and bulging membranes can reduce preterm delivery before 32 weeks and improve neonatal survival compared with bed rest. Therefore, it is important to determine whether emergency cervical cerclage can be performed or not, after repositioning the prolapsed fetal membranes. The prolongation of the pregnancy period by emergency cervical cerclage performed on patients with intra-vaginal bulging prolapsed membranes was reported to be 23.9–66.0 days on average (Table 2).^{6–8,10,11,14,15,17} In those studies, some cases were included that were of a milder cervical insufficiency than our patients. In repositioning the prolapsed membranes, it is preferable to reduce physical pressure on fetal membranes and friction while pushing as much as possible, and at the same time, to push the prolapsed membranes back into the uterine space using a wider surface area. When cervical cerclage is performed after repositioning the membranes, tools used in repositioning must be removed from the cervix carefully so as to prevent the recurrence of membrane prolapse. Various devices such as sterilized gauze, a cotton ball and balloon devices including metreu^{nyter} have been used as the tools for repositioning.^{19,20} Using the *mini metreu*, we make repositioning of fetal membranes and cervical cerclage easy. The merits of using the *mini metreu* are summarized as follows: 1 In comparison with gauze and a cotton ball, pushing back using the *mini metreu* causes less physical pressure on the fetal membranes and less friction while repositioning. 2 In comparison with the existing balloon catheter, the rod-shape part of the *mini metreu* is harder,

and pushing fetal membranes is easier. 3 It is easy to adjust the size of the balloon to the dilatation of the internal os, and to push in. 4 If the Shirodkar cerclage is performed after the McDonald cerclage, the membranes are pushed up to a high position, so the risk of amniorrhexis due to injury of the fetal membranes is small, and suturing at a level close to the internal os is possible. 5 When the Teflon tape is tied after conclusion of the cervical cerclage, the procedure of removing physiological saline from the balloon and removing the balloon through the cervix while tightening the suture is easy. As shown in the above, the merits of using the *mini metreu* are great, and this method seems not to be significantly affected by the experience or skill of the surgeon. Regrettably, this device is marketed only in Japan at the present.

Conclusion

The present study suggests that a much longer prolongation of the pregnancy period can be obtained and neonatal outcome seems to be favorable according to our control method in comparison with the methods reported in the past. Since the study group consisted of such a small number of patients, however, further accumulation of cases is necessary.

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Table1 five cases who were performed emergency cervical cerclage with our management

case	age	gravida		BPM		cerclage		findings of admission					course of delivery	delivery		newborn weight(g)	apgar score		prolonged pregnancy	
		G	P	wG	day	wG	day	WBC	CRP	dilatation of int. os(mm)	diameter of BPM(mm)	EFBW(g)		wG	day		1m	5m	since BPM(days)	since cerclage(days)
1	30	0	0	22	5	24	1	4700	0.3	27	45	484	OLP→NVD	36	4	2135	8	9	97	87
2	32	1	1	23	3	24	0	8260	0.22	16	30	688	OLP→NVD	38	5	3028	9	9	107	103
3	37	1	1	22	1	22	1	8830	0.21	28	84	699	OLP→NVD	32	3	2094	5	7	73	73
4	40	3	2	20	1	21	2	10450	2.1	26	44	284	OLP→C/S(*)	31	3	1516	6	8	79	71
5	34	2	0	19	3	20	6	16550	4.72	28	57	357(20w5d)	sudden IUFD(**)	24	0	580	-	-	32	22

BPM:bulging prolapsed membranes

wG: weeks of gestation

EFBW:estimated fetal body weight

OLP; onset of labor pain

NVD; normal vaginal delivery

C/S;cesarean section

*;previous C/S, **;cord factor

Table2

The prolongation period from the membranes prolapse to parturition with emergency cervical cerclage for fetal membranes prolapse into the vagina in second-trimester in previous reports

author	year	case		prolongation period	
		number	outline	mean(days)	SD
Daskalakis G, et.al.	2006	29	18-26wG, incompetent cervix	61.6	27.3
Makino Y, et.al.	2004	8	19-24wG, amnioreduction	32.9	46.2
Althuisius SM, et.al.	2003	13	before 27wG, incompetent cervix	54	47
Ishikawa K, et.al.	2003	10	no sign of infection	23.9	ND
Z Artmann A, et.al.	2001	19	20-27wG, incompetent cervix	66	ND
Tsatsaris V, et.al.	2001	25	incompetent cervix	31	ND
Wu MY, et.al.	1996	21	BPM were 8 cases	58	56
Ochi M, et.al.	1994	18	before 26wG, incompetent cervix	35.2	39.7

BPM:bulging prolapsed membranes

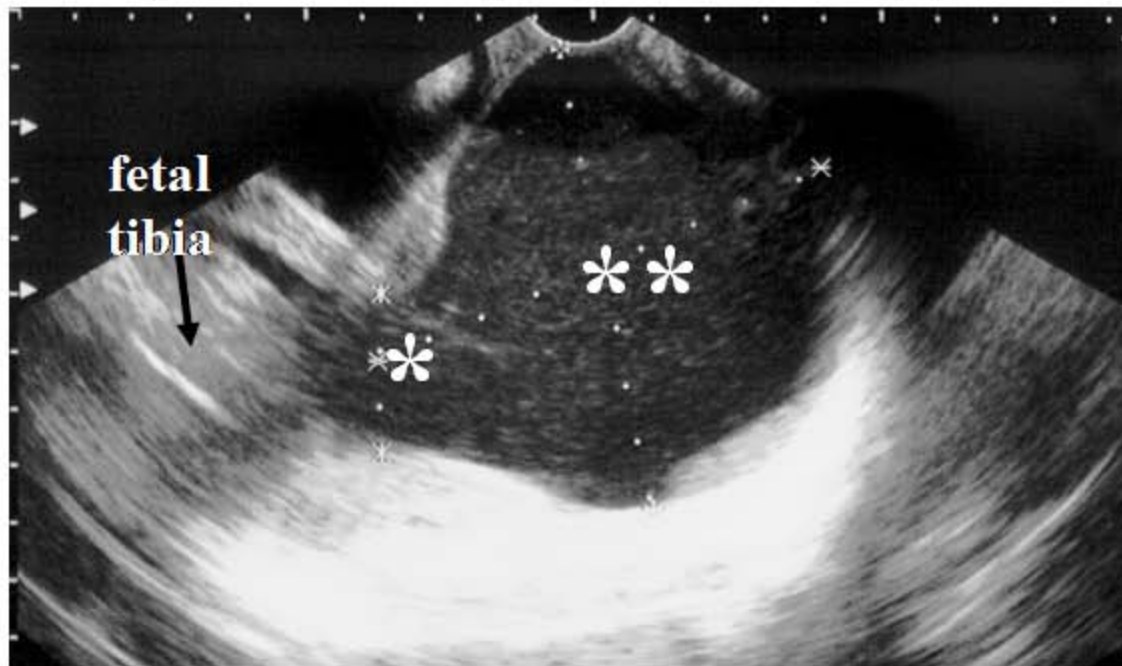
SD: standard deviation

wG: weeks of gestation

ND: not described

Fig.1 fetal membranes prolapse into the vagina as shown as Fig.3a)

a) ultrasonographic finding



b) macroscopic finding



***:Diameter of dilated internal os 28mm**

**** :Diameter of bulging prolapsed membranes
84×82mm**

Fig.2 devices for using in our procedure

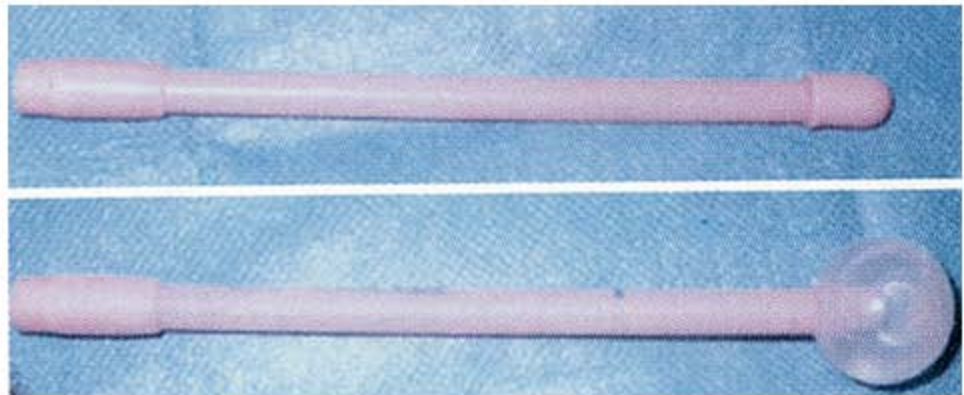
a) plain clamp



**b) Metreurynter (minimetru,
SOFT MEDICAL Co.,
Ltd., JAPAN)**

**(Above) before injection of
physiological saline**

**(below) after 20ml injection
of physiological saline**



**c) How to have the
metreurynter**



Fig.3 Our procedure of emergency cervical cerclage

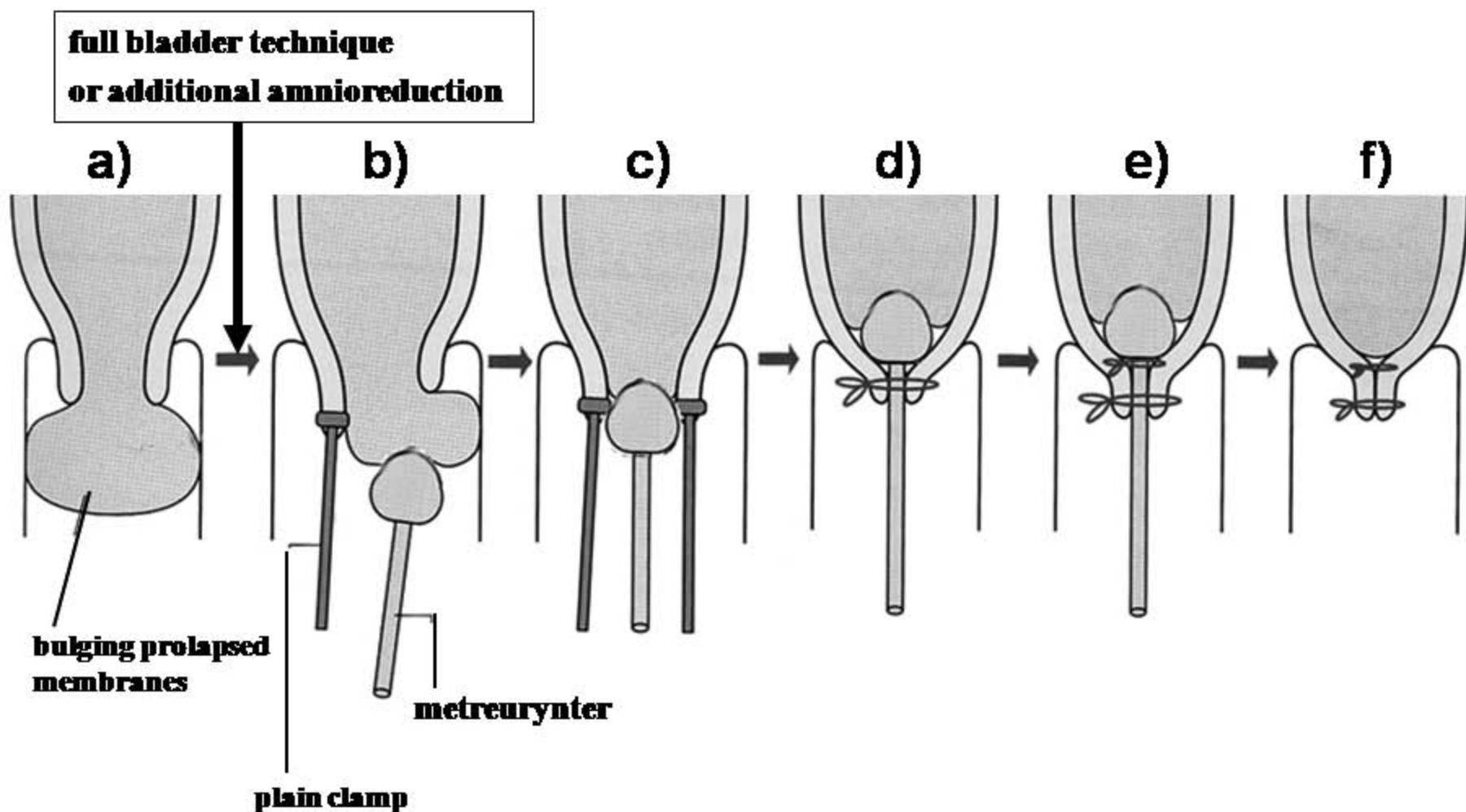
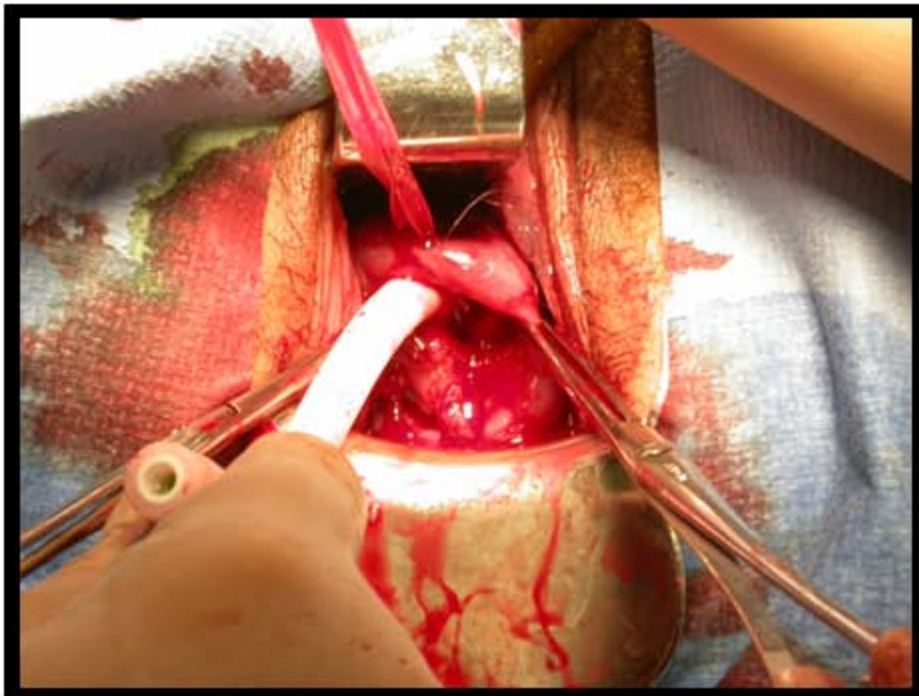
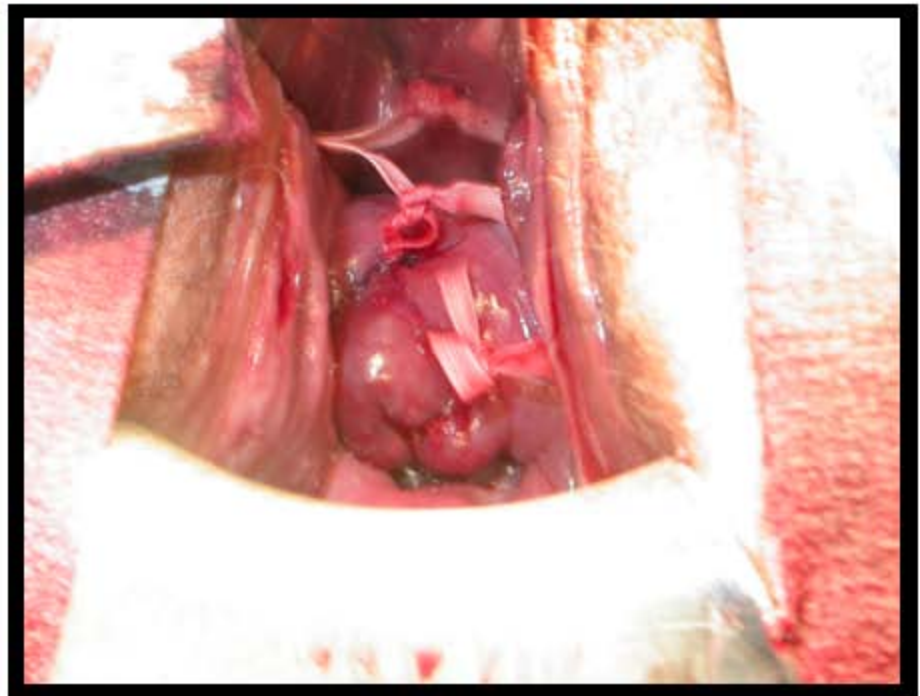


Fig.4 The pictures of our methods



**a) just before as shown as
Fig.3d)**



**b) just as shown as
Fig.3f)**