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BRIEF COMMUNICATION

# Antenatal Detection of Mosaic Trisomy 22 with a Finding of Blake's Pouch Cyst

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**Abstract** The authors report a case of mosaic trisomy 22 diagnosed antenatally by amniocentesis at 19 weeks. The ultrasound finding was an isolated posterior fossa fluid collection in the brain with features possibly suggestive of a Blake's Pouch cyst with doubtful hypoplasia of cerebellar vermis. The karyotype of the amniocytes was mos47, + 22[6]/46[8] with two separate clones of cells. Trisomy 22 was seen in one clone (43%) while the other clone (57%) had a normal karyotype. On postnatal examination after termination, there were no dysmorphic features. A selective autopsy of the fetal brain was suggestive of normal posterior fossa anatomy with normal cerebellar vermis which retrospectively confirmed the diagnosis of a Blake's pouch cyst.

**Keywords** Posterior fossa fluid collection · Mosaic trisomy 22 · Blake's pouch cyst

## Case Report

A 29-year-old primigravida was referred to authors at 19 weeks with suspected posterior fossa cyst and vermian hypoplasia. No screening for aneuploidies had been done. A neuro-sonogram confirmed a posterior fossa cystic fluid collection. The vermis was not clearly visualised with megacisterna magna in an axial section (Fig. 1a). On a sagittal section, vermis could not be clearly visualised with normal tentorium. The brainstem vermis and brainstem tentorium angles were within suggested normal range (Fig. 1b). The bilateral ventricles were not dilated, the cavum septum pellucidum and the falx cerebri were visualised. These findings raised a possibility of a Blake's pouch cyst. There were no other obvious defects. She was offered an invasive test for karyotype, review scan and a fetal MRI around 23 weeks. An amniocentesis was performed and the FISH was negative for trisomy 13, 18 or 21. The amniocytes were cultured. A total of 14 metaphases were analyzed using the GTG banding technique. The karyotype of the fetal cells was mos47, + 22[6]/46[8]. Forty-three percent cells had trisomy 22 and 57% cells had a normal karyotype (Fig. 2). A detailed discussion with the couple regarding the implications of the karyotype findings and the spectrum of possible outcomes was undertaken. Also, the legal limit for medical termination of pregnancy of 20 weeks was explained to the couple before they could decide the further plan. The couple took an informed decision to terminate the pregnancy. They were not willing for a detailed post-mortem examination however consent for a limited neurological autopsy was given.

The autopsy findings suggested that the cerebellar vermis was present with complete normal anatomy of the posterior fossa. As a Blake's pouch cyst has been known to resolve spontaneously, the normal findings confirmed the diagnosis of the same. A karyotype after the termination was not offered as the initial test was done on an amniocentesis sample and had shown a significantly high (43%) percentage of abnormal karyotype cells. A parental karyotype was done which was normal.

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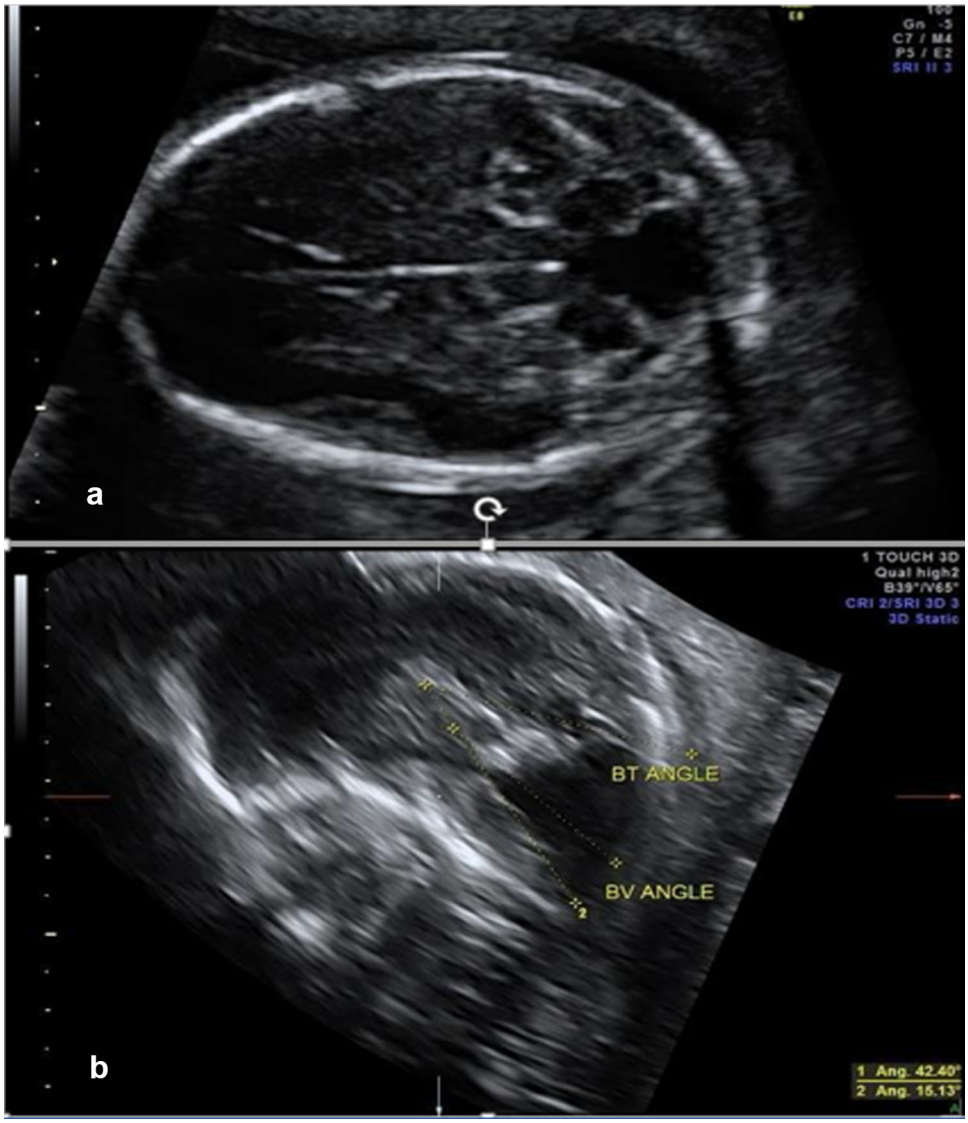


**Fig. 1** **a** An axial section through the sub-occipito-bregmatic plane showing an abnormal posterior fossa with dilated cisterna magna and no clear visualisation of the cerebellar vermis. **b**: A 3D reconstructed sagittal section from an axial plane acquisition on which the cerebellar vermis was not visualised. The tentorium appears normally oriented. The Brainstem-vermis (BV) and brain stem-tentorium (BT) angles of 15.13 degrees and 42.4 degrees were measured to aid in an objective diagnosis

## Discussion

Trisomy 22 is the third most commonly observed chromosomal abnormality in spontaneous abortions [1]. Table 1 summarises the reported literature on mosaic trisomy 22 [2–6]. To the best of authors' knowledge, this is the first reported case of mosaic trisomy 22 with an isolated posterior fossa abnormality.

The diagnosis of a Blake's pouch cyst was made based on a methodical approach using axial and 3D reconstructed sagittal sections of the posterior fossa using brainstem-vermis and brainstem-tentorium angles as described in a recent article by Volpe et al. [7]. About 40% of the posterior fossa fluid collections can be associated with chromosomal abnormalities or major anomalies. Trisomy 18 and trisomy 21 are more likely. Majority of the cases of isolated Blake's pouch cyst have been found to have normal neurological outcome [8]. Although favourable prognosis can be assigned to isolated Blake's pouch cyst, the current case emphasises the importance of a karyotype.

Children with mosaic trisomy 22 can have a gross developmental delay with intellectual disability [2, 3]. Cases with normal intelligence have been described but most had other major defects such as congenital cardiac disease, deafness and ocular defects [4, 9]. The degree of mosaicism in the tissues is not related to the outcome [10].

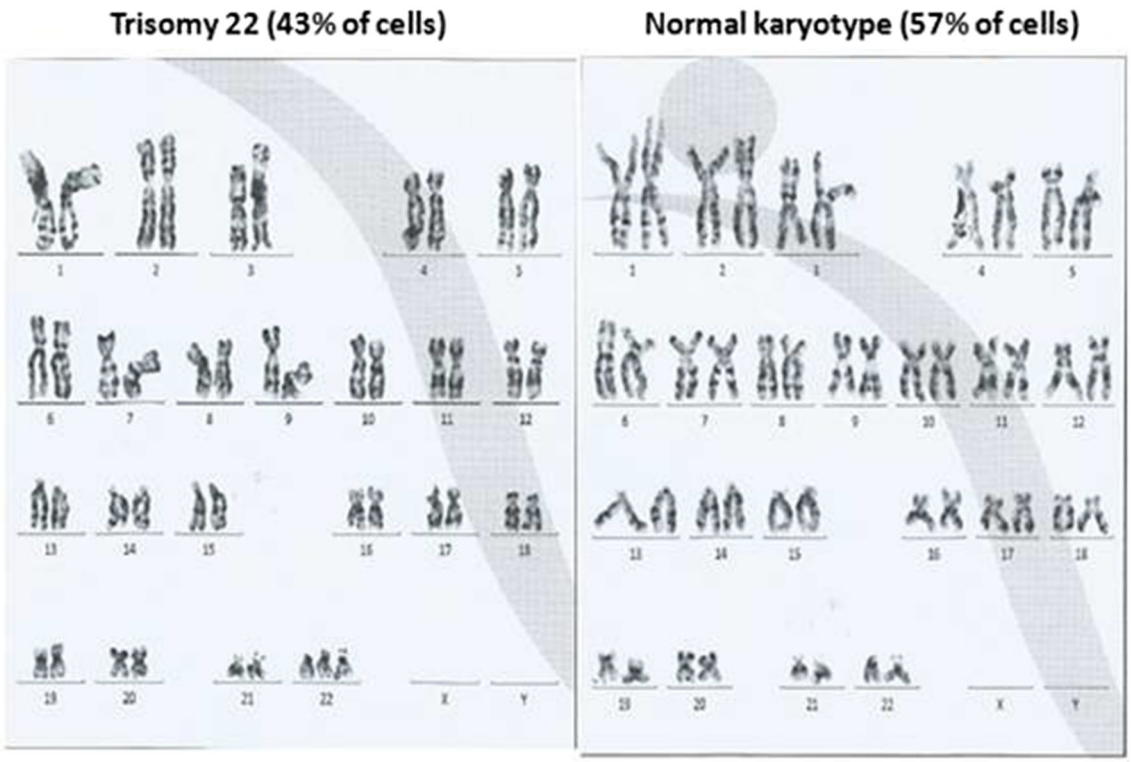


**Fig. 2** The karyotype of the fetus with two clones of cells—43% cells having mosaic trisomy 22 and 57% cells having a normal karyotype

The parents should be counselled by a multi-disciplinary team so that they can arrive at an informed decision.

The ultrasound findings reported in cases with mosaic trisomy 22 are increased nuchal thickness, tricuspid regurgitation, pericardial effusion, short long bones, oligohydramnios, single umbilical artery, hydrothorax, renal anomalies and congenital heart diseases such as tetralogy of Fallot and ventricular septal defects [2–4]. There have been cases described in literature with no major congenitally detected abnormalities [2]. The index case had an isolated finding of an abnormal posterior fossa with no other major defect. Other features to be assessed for and could be associated are hemi-hyperplasia, frontal bossing, hypertelorism, flat nasal bridge and limb abnormalities such as unilateral radial dysplasia, clino-brachydactyly and syndactyly [3, 4, 9]. The post mortem examination was the gold standard that confirmed the possible antenatal diagnosis of a Blake's pouch cyst. The authors would like to stress upon the need of a post mortem examination in all cases of major defects detected antenally which unfortunately end in a termination. A post termination karyotype was not offered as the initial results on an amniocentesis sample were suggestive of a significant percentage of trisomy 22 cells (43%) which are suggestive of a true fetal mosaicism [10].

Previous reports have described that karyotype on peripheral lymphocytes can often be negative and a karyotype on an affected tissue or skin fibroblasts is required [6]. This concept has to be taken into consideration while dealing with cases with doubtful mosaicism due to features such as hemi-hyperplasia. The prognosis of the fetus is independent of the degree of mosaicism in the fetal tissues and the parents should be counselled that the chances of fetal mosaicism in cases with positive report on a placental biopsy are about 10–13% [10, 11].

The most probable cause of mosaic trisomy 22 in the current case was a non-disjunction during meiosis phase in gametogenesis. A normal parental karyotype suggested that it was most likely a sporadic event with very low chances of recurrence in any subsequent pregnancy.

**Table 1** Summary of published case reports describing Mosaic trisomy 22

| References | Antenatal ultrasound findings | Invasive test (Gestation) | Antenatal karyotype | Outcome | Postnatal karyotype | Postnatal features | Neuro developmental outcome |
|---|---|---|---|---|---|---|---|
| Phillips [11] | FGR | CVS (11 weeks), amniocentesis (16 weeks) | Yes | Top | Yes | – | – |
| Berghella [6] | Choroid plexus cysts | Amniocentesis (18 weeks) Fetal skin fibroblasts (20 weeks) | Yes | Top | Yes | Facial dysmorphism, bilateral pulmonary polylobation | – |
| Mazza [3] | FGR, persistence of SVC, dilatation of the coronary sinus | Amniocentesis (16 weeks) | Yes | Live birth (37 weeks) | Yes | GR, facial dysmorphism, hypospadias, bilateral cryptorchidism, anterior anus, persistent SVC in the coronary sinus, | intellectual disability |
| Leclercq [2] (5 cases*) | | | | | | | |
| Case 1* | None | Amniocentesis | Yes | Live birth (41 weeks) | Yes | No abnormal feature | Normal intellectual development |
| Case 2* | FGR | Amniocentesis (33 weeks) | Yes | IUFD (34 weeks) | No | Dysmorphic features | – |
| Case 3* | Increased NFT and FGR, hydrothorax | Amniocentesis (24 weeks) | Yes | Top | No | – | – |
| Case 4* | FGR | Amniocentesis (24 weeks) | Yes | IUFD (33 weeks) | No | Multiple congenital anomalies and GR | – |
| Case 5* | FGR, oligohydramnios | No | No | Live birth (29 weeks) | Yes | GR, multiple congenital anomalies, facial dysmorphism, cortical atrophy | – |
| Abdelgadir [4] (2 cases)† | | | | | | | |
| Case 1† | FGR, moderate TR, small pericardial effusion | Amniocentesis | Yes | Live birth (35 weeks) | Yes | GR, facial dysmorphism, hemangiomas, clinodactyly, ASD, PDA,TR, non-compaction of left and right ventricles, severe pulmonary stenosis, | Normal intelligence |
| Case 2† | FGR, increased NT, short femur, two vessel cord, TOF | No (declined) | No | Live birth (39 weeks) | Yes | GR, facial dysmorphism, clinobrachydactyly, anterior anus, PDA, TOF, hemihyperplasia | Normal intelligence |
| Index case | Isolated posterior fossa fluid collection, FGR | Amniocentesis | Yes | Top | No | No dysmorphic findings, normal brain autopsy | – |

*ASD* Atrial septal defect; *CVS* Chorionic villous sampling; *FGR* Fetal growth restriction; *GR* Growth retardation; *IUFD* Intra-uterine fetal death; *NFT* Nuchal fold thickness; *NT* Nuchal translucency; *PDA* Patent ductus arteriosus; *SVC* Superior vena cava; *TOF* Tetralogy of Fallot; *TOP* Termination of pregnancy; *TR* Tricuspid regurgitation

* Casesin paper by Leqlercq et al. [2];

† Cases in paper by Abdelgadir et al. [4]

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