

## Letters to the Editor

### Congenital hypoplasia of the abdominal wall muscles following fetal ascites due to parvovirus B19 infection

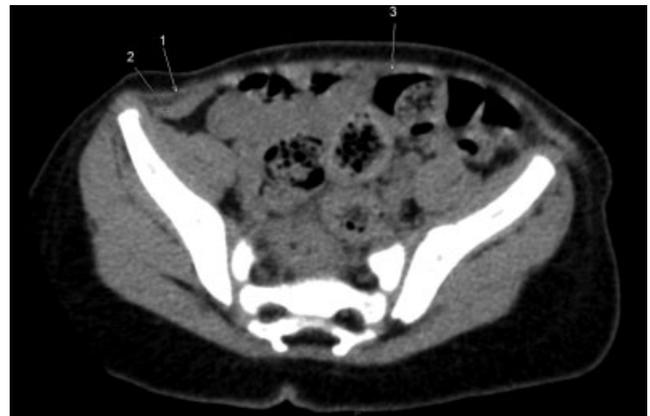
Maternofetal parvovirus B19 infection may be a cause of fetal hydrops through fetal anemia or myocarditis and heart failure<sup>1,2</sup>. We report a case of fetal hydrops with subsequent postnatal muscular hypoplasia and major persistent abdominal distension.

A 25-year-old woman, gravida 2 para 1, was referred at 22 weeks' gestation for fetal hydrops detected at routine ultrasound scan. Findings included abundant fetal ascites and moderate pericardial effusion. Abdominal circumference was 203 mm (99<sup>th</sup> centile). Middle cerebral artery peak systolic velocity, at 56 cm/s, was >1.5 multiples of the median. Serology testing was positive for parvovirus B19 immunoglobulin-M. Fetal anemia was confirmed by blood sampling (hemoglobin 4.4 g/dL) and an *in-utero* transfusion restored hemoglobin to 14 g/dL. Parvovirus infection was confirmed by polymerase chain reaction. Paracentesis was performed at 25 weeks' gestation for persistent abundant ascites. Labor was induced at 41 + 6 weeks and a female infant weighing 3710 g was delivered vaginally with a 5-min Apgar score of 10. The neonate's abdomen was enlarged but without significant ascites. Subsequent follow-up showed hypoplasia of the anterior and lateral abdominal wall muscles visible during crying as two lateral subumbilical oval projections (Figure 1). Distension continued at 1 and 2 years. Computed tomography showed hypoplasia, mainly of the internal oblique and transverse muscles of the abdomen (Figure 2). The rectus abdominis muscle was affected to a lesser degree.

According to embryological studies, diastasis recti abdominis would result from disruptive phenomena before the fusion of myotomes during the eighth week, while muscular hypoplasia should result from later



**Figure 1** Clinical examination of the infant at 1 year of age, showing bilateral projection of the abdominal wall (visible during crying).



**Figure 2** Computed tomography image (axial view) of the abdomen obtained at 2 years of age, at the level of the iliac wings. On the right, internal oblique (1) and transverse (2) muscles of the abdomen are clearly distinguished. The internal oblique muscle is very thin. On the left, only one of these two muscles is visible and also appears thin, as does the rectus abdominis muscle (3).

phenomena. Several genetic disorders such as prune belly syndrome and Poland syndrome may be involved in abdominal muscle defects<sup>3,4</sup>. In our case, the anomaly was isolated and followed mechanical distension associated with massive ascites. The severity of ascites, its persistent duration for at least 1 month and the early gestational age at onset – somewhere between 12 and 22 weeks – might suggest a purely mechanical explanation. However, no previous case of muscle hypoplasia in the context of fetal ascites has been reported, including after major parietal distension<sup>5</sup> or fetal hydrops. Other factors might predispose to or aggravate muscle fragility.

Several genes are involved in myogenesis<sup>6</sup>. None of these has known transcriptional or post-transcriptional modification due to parvovirus, but some genetic predispositions of weakness or diastasis of the rectus abdominis muscle exist<sup>7</sup>, in which excess intra-abdominal pressure may be pathogenic. Parvovirus infection has been found to be associated with juvenile dermatomyositis and extreme muscle weakness<sup>8</sup>. Parvovirus-related myositis and fasciitis with infectious necrosis have also been described<sup>9</sup>, but parvovirus-related primary damage of the peripheral nerve has not been previously described, although parvovirus infections can cause damage to the fetal central nervous system<sup>10</sup>. Finally, ischemia due to vascular compression might produce this type of damage, similar to that seen during the formation of gastroschisis. A combination of the above mentioned factors could be responsible for muscle hypoplasia.

Studies are necessary to assess whether parvovirus B19 may be directly involved in alterations of myogenesis in order to support a non-mechanical explanation for abdominal muscle hypoplasia. Considering the

possible multifactorial etiology, there is no evidence that peritoneal–amniotic shunting could improve parietal development in such cases.

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## Hysterosalpingo-foam sonography (HyFoSy): a new technique to visualize tubal patency

Assessment of Fallopian-tube patency is an important part of routine infertility work-up, as tubal obstruction is estimated to play a role in 12–33% of infertile couples<sup>1,2</sup>. Several tests are available for this purpose, including hysterosalpingography, laparoscopy and dye test, selective salpingography and hysterosalpingo-contrast sonography (HyCoSy). HyCoSy allows assessment of the outline of the uterine cavity and patency of the Fallopian tubes. It can be performed with standard transvaginal ultrasonography equipment. An echogenic medium is injected

transcervically using a cannula or applicator. The accuracy of HyCoSy has been found to be comparable to that of hysterosalpingography<sup>3,4</sup>.

A commonly used echogenic medium is Echovist® (Bayer Schering Pharma AG, Berlin, Germany), a suspension of slowly soluble galactose microparticles in an aqueous solution<sup>5</sup>. No allergic-type reactions for Echovist have been reported so far, but galactose allergy is a well known contraindication. Adverse reactions other than pain (vasovagal reactions, nausea, vomiting, hyperventilation and sweating) have been recorded in 5% of cases<sup>6</sup>.

The commercial availability of Echovist for gynecological use is currently limited in most countries. The use of air with saline has been suggested by others as a cheap and easy-to-use alternative to Echovist<sup>7</sup>. However, as air bubbles disappear directly after mixing air and saline by shaking, it is only possible to inject air and saline intermittently into the uterine cavity by tilting a syringe filled with air and saline in order to alternate which is injected. In 2007 a non- (embryo-) toxic gel (ExEm-gel® Gynaecologiq BV, Delft, The Netherlands), containing hydroxyethylcellulose and glycerol, was introduced as an intrauterine medium for sonohysterography as an alternative to saline. Gel instillation offers a more stable filling of the uterine cavity and the technique has been associated with minimal inconvenience for the patient<sup>8</sup>. This gel and its compounds have been tested extensively and safely used in medicine<sup>9–13</sup>. To date more than 10 000 gel-instillation procedures with ExEm-gel have been performed without any serious side-effects (personal communication with the manufacturer).

When this gel is pushed rigorously through small openings in syringes or tubes, turbulence causes local pressure drops resulting in air dissolving in the solution, and yielding foam that is stable for several minutes. ExEm-gel (containing 88.25% purified water), however, is rather viscous for passing into the Fallopian tubes. Therefore 10 mL ExEm-gel was diluted with 10 mL purified water (to give a mixture containing 94.12% water) and mixed to create foam (Figure 1). The mixture at this ratio created foam that was sufficiently stable to show echogenicity for at least 5 min and sufficiently fluid to pass through patent tubes. The viscosity of this foam (270 cP) is comparable with that of Echovist (400 cP).

In the first 30 patients in whom hysterosalpingo-foam sonography (HyFoSy) was performed (Figure 2) the procedures were uneventful. Furthermore, four viable pregnancies have so far been diagnosed following the procedure. Patent Fallopian tubes, and even spillage into the abdominal cavity, were visible. The efficacy of the procedure will be analyzed systematically in a larger group of patients and reported in the near future. For evaluation of the uterine cavity we prefer to use undiluted ExEm-gel, as the echogenicity of the foam can mask intracavitary abnormalities. As the ingredients of this foam are identical to those of ExEm-gel we expect that allergy and complications will be equally rare. No

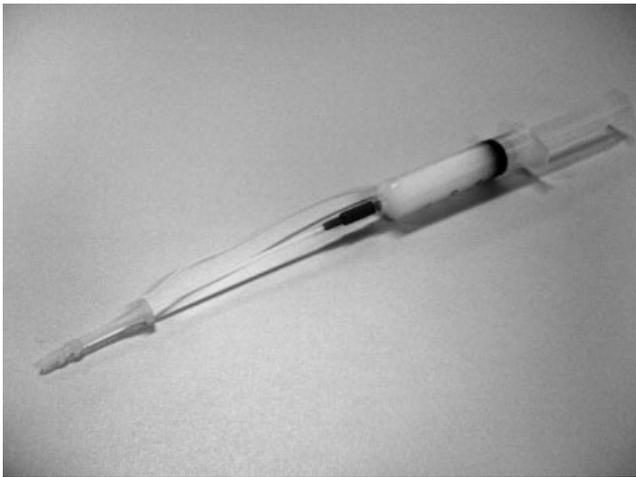


Figure 1 Syringe with foam and cervical applicator for the hysterosalpingo-foam sonography technique.



Figure 2 Ultrasound image during hysterosalpingo-foam sonography showing patency of both Fallopian tubes.

cautions are needed with regard to pregnancy in the same menstrual cycle as the HyFoSy procedure. It can be expected that with the increasing use of hysteroscopic sterilization techniques, contrast sonography will play a more important role as a reference test for demonstrating adequate positioning of intratubal devices and/or tubal blocking.

We think that in HyFoSy we have found a clean, safe, non- (embryo-) toxic and less expensive alternative to HyCoSy that can be performed by a single operator in the office or ambulatory setting.

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