Limb-Body Wall Complex, Report of 2 Cases with Their Quintessence in Prenatal Diagnosis

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Abstract

Limb-body wall complex is a complicated fetal malformation with the essential features of : 1) exencephaly/encephalocele with facial clefts, 2) thoraco- and/or abdominoschisis, and 3) limb defect. The diagnosis was based on two of three of the above features. We report 2 cases of limb-body wall complex. The first case had thoraco-abdominal and limb anomalies while the other had abdominal wall, limb and neuro-facial anomalies. Both cases were diagnosed prenatally by ultrasonography. They were terminated by medical induction. Chromosome studies were evaluated for academic purposes. Autopsies were done to confirm diagnosis. Aspects of their varieties of clinical features, differences in differential diagnosis, and pitfalls in prenatal diagnosis were discussed.

Key word : Limb-Body Wall Complex, Prenatal Diagnosis

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Case 1.

The first case was the fetus of a 27 year old pregnant woman who attended the antenatal care clinic of Thammasat University Hospital on December 13,1997. This woman was gravida 1 parity 0 whose gestational age by date calculation was 27 weeks. She had never attended the antenatal care before. She had no underlying diseases and denied any history of drug addiction, alcoholic ingestion, smoking, and radiation exposure within one year. There was no history of genetic disorders in her family. Her husband's age was 30.

At the first visit, she was given a complete examination and no detectable abnormality on general examination was revealed. On abdominal palpation, fundus-pubic symphysis tape measurement was 30 cm that was interpreted as a large for date uterus and an ultrasound was performed.

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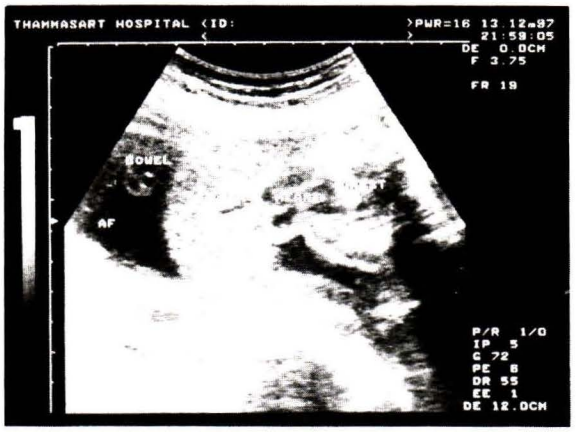

Fig. 1. Ultrasound print showing ectopia cordis protruding from the fetal chest wall and the protruding liver.

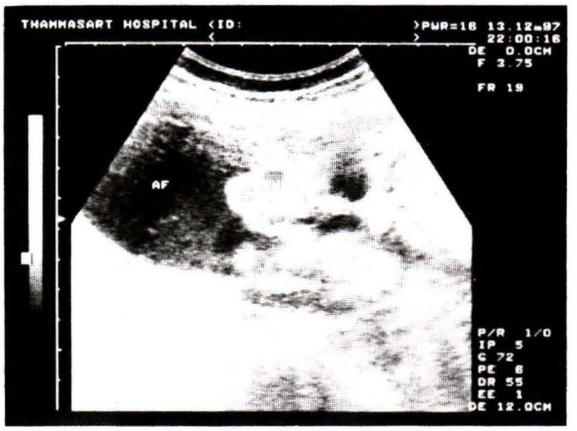

Fig. 2. Ultrasound print showing protruding bowel from the fetal abdomen and a large amount of amniotic fluid.

Laboratory tests showed non-reactive VDRL, negative HBsAg, negative Anti-HIV, a hematocrit of 38, blood group O and normal urinalysis.

Ultrasound study revealed a fetus with a gestational age of 27 weeks, polyhydramnios with an amniotic fluid index of 28, thoracoschisis with ectopia cordis (no evidence of intrinsic heart anomaly), abdominoschisis with protruding liver (Fig. 1) and protruding bowel (Fig. 2), scoliosis of the fetal lumbar spine, hypoplastic right upper extremity and distorted right hand. Craniofacial and central nervous system anomalies were not seen.

The malformed fetus was prenatally diagnosed as limb-body wall complex. The diagnosis of limb-body wall complex is based on two out of three of the following features. 1) exencephaly/encephalocele with facial clefts, 2) thoraco- and/or abdominoschisis, and 3) limb defect. The diagnosis of this case was the combination of thoraco-abdominoschisis and limb defect. The anomalies were severe and assessed as incompatible with life. This case was managed by termination with medical induction (prostaglandin $F_2\alpha$). The malformed baby died shortly after termination.

On gross examination of the terminated fetus, a female baby with normal appearing external head and face, chest defect with ectopia cordis, protruding liver, stomach, small bowel, and large bowel (Fig. 3), abdominal wall defect at right side of the umbilical insertion (no peritoneal sac), small, distorted and displaced right upper extremity and scoliosis of thoracolumbar spine (Fig. 4) were detected.

The autopsy revealed no central nervous system anomalies, no intrinsic heart anomalies and no herniation of fetal diaphragm. The diagnosis was confirmed as limb-body wall complex. Chromosome study was performed from umbilical blood. The result was 46,XX.

Case 2.

The second case was the fetus of a 33 year old pregnant woman who attended the antenatal care clinic of Thammasat University Hospital on February 18, 2000. This woman was gravida 2 parity 1 with a gestational age by date calculation of 18 weeks. She had had asthma for 6 years but had not had an acute asthmatic attack while being pregnant. She denied any history of drug addiction, alcoholic ingestion, smoking, and radiation exposure within one year. There was no history of genetic disorders in her family. Her husband's age was 33. Her first child was born normally in 1987 with a birth weight of 2700 gram. The first baby was healthy at birth and no anomaly was detected.

At the first visit, she was examined completely and there was no detectable abnormality on general examination. On abdominal palpation,

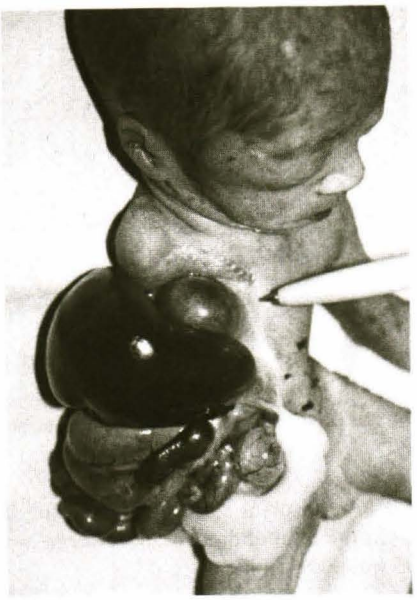

Fig. 3. Picture of the malformed baby showing chest defect with ectopia cordis, protruding liver, stomach, small bowel and large bowel. The abdominal wall defect was found at the right side of the umbilical insertion.

Fig. 4. Picture of the malformed baby showing small, distorted and displaced right upper extremity and scoliosis of thoracolumbar spine.

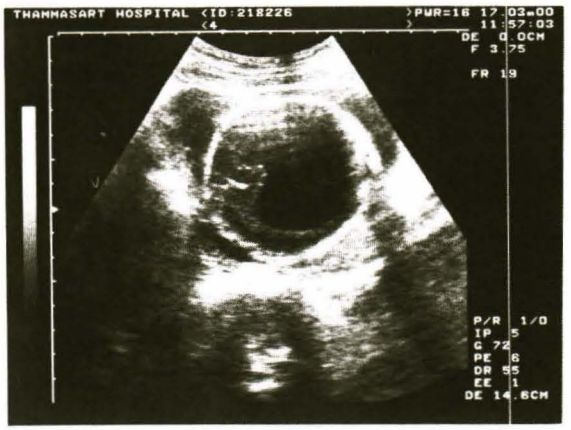

Fig. 5. Ultrasound print showing holoprocencephaly of the fetal brain.

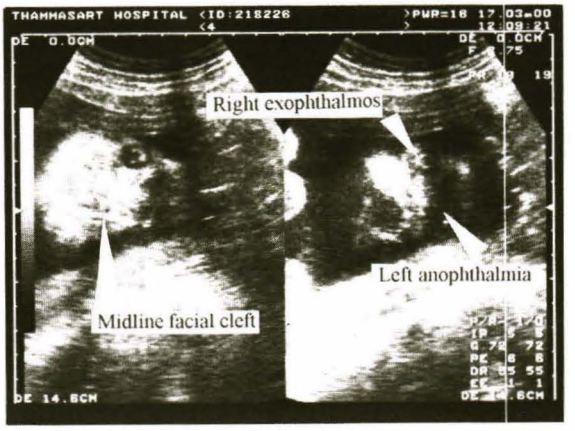

Fig. 6. Ultrasound print showing absence of left eye, enlarged right eye and facial cleft.

fundus-pubic symphysis tape measurement was 22 cm that was interpreted as a large for date uterus. She was advised to have an ultrasound study but she refused because of a financial problem. Routine laboratory tests were non-reactive VDRL, negative HBsAg, negative Anti-HIV, a hematocrit of 34, blood group B and normal urinalysis. She returned for a second antenatal visit on March 17, 2000.

Fig. 7. Picture of the malformed baby showing protruding liver and bowel, absence of left upper extremity, midline facial cleft, absence of nose, left anophthalmos and right exophthalmos.

Gestational age at this time was 22 weeks and fundus-pubic symphysis tape measurement was 25 cm. Ultrasound study was performed at this visit.

The ultrasound study revealed a gestational age of 21 weeks, polyhydramnios with an amniotic fluid index of 27, abdominoschisis with protruding liver and bowel (no covering peritoneal sac), scoliosis of the fetal lumbar spine, absence of left upper extremity, hypotrophic right upper extremity and distorted right hand, holoprocencephaly of the fetal brain (Fig. 5), absence of left eye, enlarged right eye and facial cleft (Fig. 6).

The malformed fetus was prenatally diagnosed as limb-body wall complex. The diagnosis of this case was the combination of neuro-facial defects, limb anomaly, and abdominoschisis. The anomalies were severe and assessed as incompatible with life. This case was managed by termination with medical induction (Cytotec). The malformed baby died shortly after termination.

Gross examination of the terminated fetus revealed protruding liver, stomach, small bowel and large bowel, phocomelia of left upper extremity, scoliosis of thoracolumbar spine, midline facial cleft, absence of nose, left anophthalmos and right exophthalmos (Fig. 7).

The autopsy confirmed holoprocencephaly and revealed no evidence of diaphragmatic hernia and intrinsic heart anomalies. The diagnosis was confirmed as limb-body wall complex. Chromosome study was performed from umbilical blood. The result was 46,XY.

DISCUSSION

Limb-body wall complex is a complicated fetal malformation with the essential features of : 1) exencephaly/encephalocele with facial clefts, 2) thoraco- and/or abdominoschisis, and 3) limb defect. The diagnosis is based on two of three of the above features[1,2]. It is a rare congenital anomaly with the varying prevalence of 1:4000 births [3], 1:15000 births[4], and 1:39000 births[5]. In Thammasat University Hospital, we have prospectively collected data of all births for a 3 year period from June 1997 to June 2000. We have found 2 cases of limb-body wall complex that calculated as 1:4500 births.

The first case in this report had thoracoabdominal anomalies (schisis with ectopia cordis and protruding intraabdominal organs without omphalocele) and limb anomalies. The interesting feature is ectopia cordis. Ectopia cordis is a very rare condition which can occur solely or as part of a syndrome, usually Pentalogy of Cantrell[6,7]. Ectopia cordis is less common in limb-body wall complex[3]. The first differential diagnosis of the first case in our study should have been Pentalogy of Cantrell which has the combination of abdominal wall defect with omphalocele, ectopia cordis, diaphragmatic hernia, intrinsic heart anomaly and pericardial effusion[6,7]. This case had the combination of abdominal wall defect and ectopia cordis. Although ectopia cordis is less common in limb-body wall complex, abdominal wall defect with protruding visceral organs without omphalocele is more possible in limb-body wall complex (especially a defect which is eccentric, large and lateral to the umbilical insertion)[3,6,7]. Degree of suspicion is decreased for Pentalogy of Cantrell if the protruding visceral organs are not covered by omphalocele (midline defect at the umbilical cord insertion)[8,9]. Therefore, diagnosis is closer to limb-body wall complex especially when com-

bined with limb anomaly. The other feature that obstetric ultrasonologists should look for is scoliosis which is a common finding associated with limb-body wall complex (even though it is not a diagnostic criteria). If scoliosis is detected, limb-body wall complex is more likely[1-3]. However, there has been a case report of an infant with midline thoracoabdominal schisis, ectopia cordis, omphalocele, diaphragmatic hernia and limb defects [10]. That case had the concurrent anomalies which were the overlapping features of limb-body wall complex and Pentalogy of Cantrell and the authors could not specifically diagnose the case.

The second case in our study had abdominal wall defect, limb defect and neuro-facial anomalies. The interesting features are neuro-facial anomalies (holoprocencephaly, left anophthalmos, right exophthalmos and facial cleft). Most likely differential diagnosis of this case should be amniotic band syndrome. Amniotic band syndrome may similarly have all of the abdominal wall, limb and neuro-facial defects[11]. Scoliosis may also be seen in amniotic band syndrome[11]. There are 3 reasons explaining why this case is closer to limb-body wall complex. The first reason; in amniotic band syndrome, amniotic fluid should be decreased and amniotic band may be present on ultrasound study. If amniotic fluid is markedly decreased, amniotic band may not be seen on ultrasound study, but it should be detected after delivery[11,12]. In our case, amniotic band was not detected, in contrast; amniotic fluid volume was increased (polyhydramnios). The second reason; in amniotic band syndrome, limb anomalies are usually prominent [11,12]. Constriction of limbs are common. Phocomelia is often found in more than one extremity. Club foot may also be found. In our case, these features were not detected except phocomelia which occurred in only one extremity while other extremities appeared very normal. The last reason; holoprocencephaly is an unlikely anomaly in amniotic band syndrome[11,12]. However, it is interesting that facial cleft (as in our case) is also found in amniotic band syndrome[13]. Moreover, abdominal wall defect (as in our case) is also found in amniotic band syndrome[14]. This is why diagnosis must be intensively analyzed especially between limb-body wall complex and amniotic band syndrome.

The other possible differential diagnosis of our second case is chromosome anomaly, such as trisomy13. Holoprocencephaly and abdominal wall defect can also be detected in chromosome anomaly[15]. However, abdominal wall defect in trisomy fetus should be an omphalocele and there may be other concurrent anomalies such as heart anomalies[15]. Our case was also confirmed by chromosome study with the result of normal 46, XY.

Etiology and pathophysiology of limb-body wall complex are not discussed here. Most cases are etiologically unknown. Chromosomes do not generally get involved. In our two cases, no history or evidence of explainable etiologic pathology was disclosed. Prognosis of limb-body wall complex is uniformly poor. Management is a termination of pregnancy.

SUMMARY

This report of two cases mainly discusses the prenatal diagnosis. Their quintessence may be concluded that as follows :

1. Prenatal diagnosis is essential for limb-body wall complex. Because prognosis is uniformly poor, earlier diagnosis leads to earlier termination. Earlier termination leads to fewer complications to the mother.

2. Indication for ultrasound study in these two cases was large for date uterus (because of polyhydramnios). Indeed, prenatal diagnosis for limb-body wall complex can be made much earlier than it was in these two cases. We do not do routine ultrasound screening in our institute. Ultrasound screening is very beneficial but may be discussed in terms of cost and benefit. Routine maternal serum alphafetoprotein screening is done in some institutes, it is also beneficial in the earlier diagnosis of limb-body wall complex.

3. The two cases in our study had a variety of clinical features. The differential diagnosis can be made differently as discussed. Limb-body wall complex has different varieties and may overlap with other syndromes.

4. Prenatal diagnosis must be made carefully because it leads to proper management. Two points are concluded from this report ;

4.1. When an abdominal wall defect is detected, ultrasonologists should look for other anomalies because prognosis is different. A sole abdominal wall defect (gastroschisis / omphalocele) has better prognosis, pregnancy may be continued and the defect may be correctable. Therefore, if limb-body wall complex is prenatally diagnosed and

considered for a termination, it must be diagnosed carefully to make sure it is not a sole anomaly of the abdominal wall (gastroschisis / omphalocele).

4.2. When holoprocencephaly is detected (as seen in our second case), it is usually considered for chromosome study. Ultrasonologists should look for other anomalies. If it is considered to be part of limb-body wall complex, a chromosome study is no longer indicated and that may reduce the cost to the patient.

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รายงานผู้ป่วย 2 รายเป็นทารกที่พิการแต่กำเนิดด้วยภาวะ Limb–body wall complex

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รายงานผู้ป่วยจำนวน 2 ราย เป็นทารกพิการแต่กำเนิดด้วยภาวะ limb–body wall complex พบที่โรงพยาบาลธรรมศาสตร์ ในระยะเวลาการเก็บข้อมูล 3 ปี ระหว่างเดือนมิถุนายน 2540 ถึง มิถุนายน 2543 limb–body wall complex เป็นความพิการแต่กำเนิดของทารกที่ประกอบด้วยลักษณะเฉพาะ 3 อย่าง ดังนี้ 1) ความพิการที่ศีรษะ 2) ความพิการที่ผนังทรวงอก และ/หรือ ผนังหน้าท้อง และ 3) ความพิการที่แขน ขา การวินิจฉัยใช้ข้อบ่งชี้ 2 ใน 3 ลักษณะข้างต้น ทารกรายแรกมีความพิการที่ผนังทรวงอกและผนังหน้าท้องร่วมกับความพิการที่แขน ทารกรายที่สองมีความพิการที่ศีรษะ แขนและที่ผนังหน้าท้อง ทารกทั้ง 2 รายได้รับการวินิจฉัยได้ก่อนคลอดโดยการตรวจด้วยคลื่นเสียงความถี่สูง การรักษาได้แก่การสิ้นสุดการตั้งครรภ์ ทารกทั้ง 2 รายเสียชีวิตในไม่ช้าหลังคลอด นอกจากนี้ ได้ทำการตรวจโครโมโซมของทารกและทำการชันสูตรศพทารกทั้ง 2 ราย รายงานผู้ป่วยครั้งนี้อภิปรายในประเด็นเกี่ยวกับลักษณะความพิการที่พบแตกต่างกันได้ในแต่ละราย การวินิจฉัยแยกโรคที่แตกต่างกัน และความผิดพลาดที่อาจเกิดขึ้นรวมถึงข้อพึงระวังในการวินิจฉัยก่อนคลอด

คำสำคัญ : limb–body wall complex, การวินิจฉัยก่อนคลอด

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