Dear Philippe, Eva:

As Philippe said in the introduction, the combination of the findings will help resolve the case like a puzzle:

- Image 1: the shortening of the tibia allows us to make the diagnosis of short long-bones, mesomelia
- Images 2-3: sagittal section of the fetus allows us to visualize very narrow thorax
- Image 4: sagittal section of the fetal spine shows a normal ossification of the vertebral bodies
- Images 5-6: postaxial polydactyly, I think the hands (2D image) and toes (in 3D)
- Image 7: 4-chamber view where it is possible to demonstrate primarily an atrial septal defect, almost a single atrium, and perhaps a slightly hypoplastic left ventricle
- Image 8: aortic arch in which you can see a slight narrowing after the departure of the brachiocephalic trunks
- Video: moving images show cardiac area as described above (single atrium, ventricular asymmetry) and also a ventricular septal defect and narrowing of the aorta visible in the image of three vessels and trachea.

Six entities are included in the short-rib dysplasias syndromes with or without polydactyly (SR(P)S):

- type I (Saldino-Noonan)
- type II (Majewski)
- type III (Verma-Naumoff)
- type IV (Beemer-Langer)
- asphyxiating thoracic dystrophy (Jeune syndrome)
- chondroectodermal dysplasia (Ellis-van Creveld syndrome)

Ultrasound diagnosis of chondroectodermal dysplasia is based on detection of the following signs: short-limb dwarfism, moderately severe thoracic hypoplasia with short ribs, postaxial polydactyly, dysplastic nails and teeth and congenital heart disease. The dwarfism primarily affects the middle and
distal segments of the limbs so that the tibia and fibula and radius and ulna are disproportionately short. All affected individuals have polydactyly of the hands and approximately 10% have polydactyly of the feet. Approximately half of affected individuals have congenital heart disease, most commonly an atrial septal defect; often with a single atrium. Other congenital heart defects have been described, such as defects of the mitral and tricuspid valves, patent ductus, ventricular septal defect and hypoplastic left heart syndrome. Ellis-Van Creveld syndrome is an autosomal recessive skeletal dysplasia, been identified mutations in EVC1 and EVC2 genes located on chromosome 4p16 as causative.

The main ultrasound finding that leads to the diagnosis of Jeune syndrome is the extremely severe thoracic hypoplasia with additional findings, such as moderate rhizomelia and renal anomalies. The ultrasound diagnosis of short-rib polydactyly syndromes is based on the detection of severe micromelia, severe thoracic hypoplasia with short ribs, and postaxial polydactyly, being able to find another anomalies such as congenital heart disease, median cleft lip, polycystic kidney/renal dysplasia, and anophthalmia. Except for Jeune syndrome and SRPS type IV (Beemer-Langer), polydactyly is a common finding. Radiographically and histologically, SRP III most resembles some forms of Ellis-van Creveld syndrome.

The differential diagnosis should include condroectodermal dysplasia, asphyxiating thoracic dysplasia, the short rib/polydactyly syndromes, and other skeletal dysplasias with mesomelic and acromelic shortening of the limbs. Condroectodermal dysplasia is characterized by thoracic hypoplasia of variable degree and polydactyly, whereas, in thoracic asphyxiating dystrophy, the degree of thoracic hypoplasia is significantly more pronounced and polydactyly is absent. The short-rib polydactyly syndromes present more severe thoracic hypoplasia and, above all, micromelia, which is absent in thoracic asphyxiating dystrophy.

Given the above, I believe that the diagnostic possibilities are:

- chondroectodermal dysplasia (Ellis-van Creveld syndrome) MIM ID #225500 (answer #1)
- any of the short-rib polydactyly syndromes, mainly the III (Verma-Naumoff), II or I (answer #2)
– finally, although I consider it very unlikely asphyxiating thoracic dystrophy (Jeune syndrome) MIM ID %208500 (answer #3)

– more unlikely is that this was a orofacial digital syndrome type IV or Mohr-Majewski syndrome.

Kind regards,

Javier