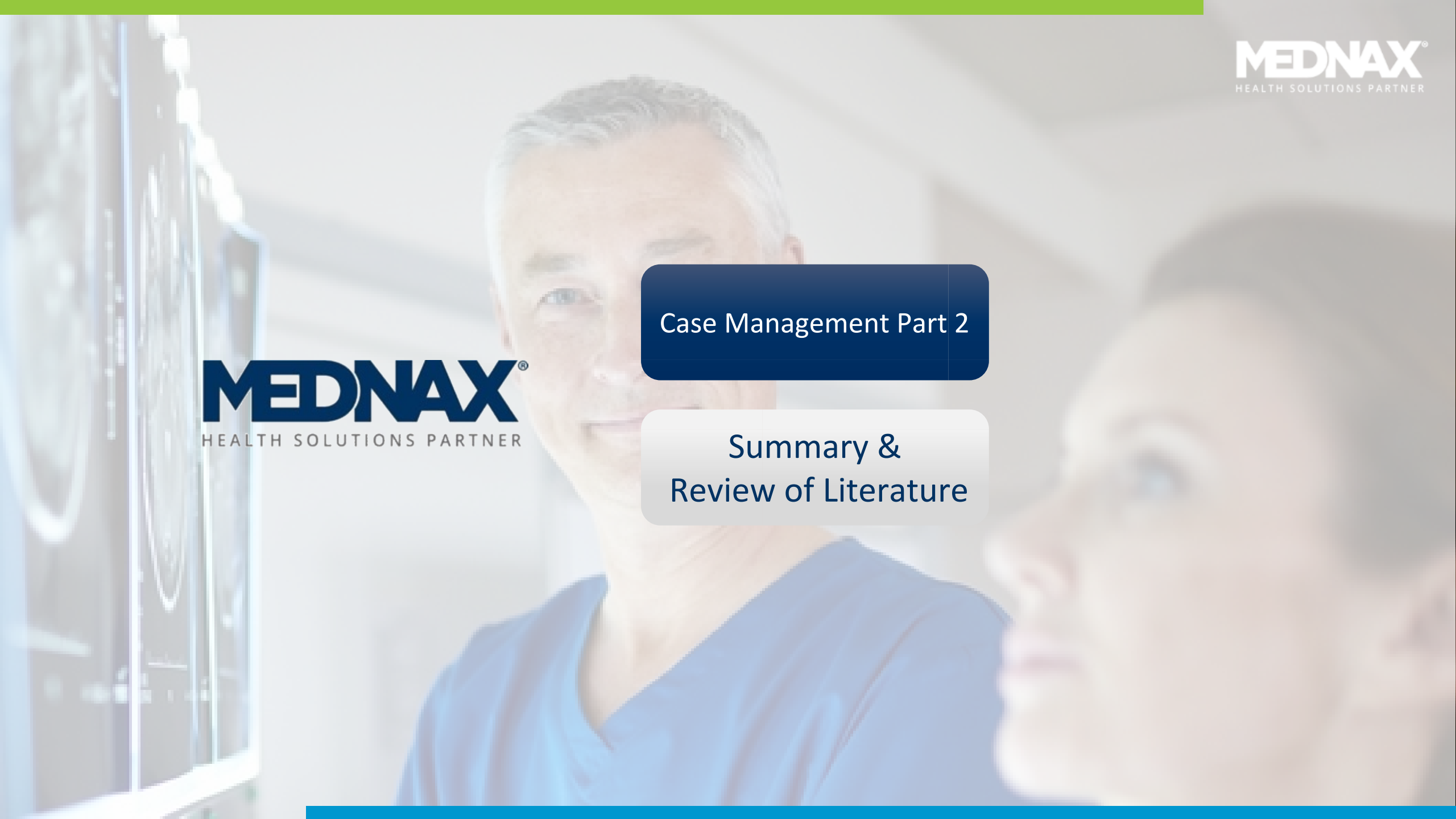


Case Management Part 2

Summary & Review of Literature

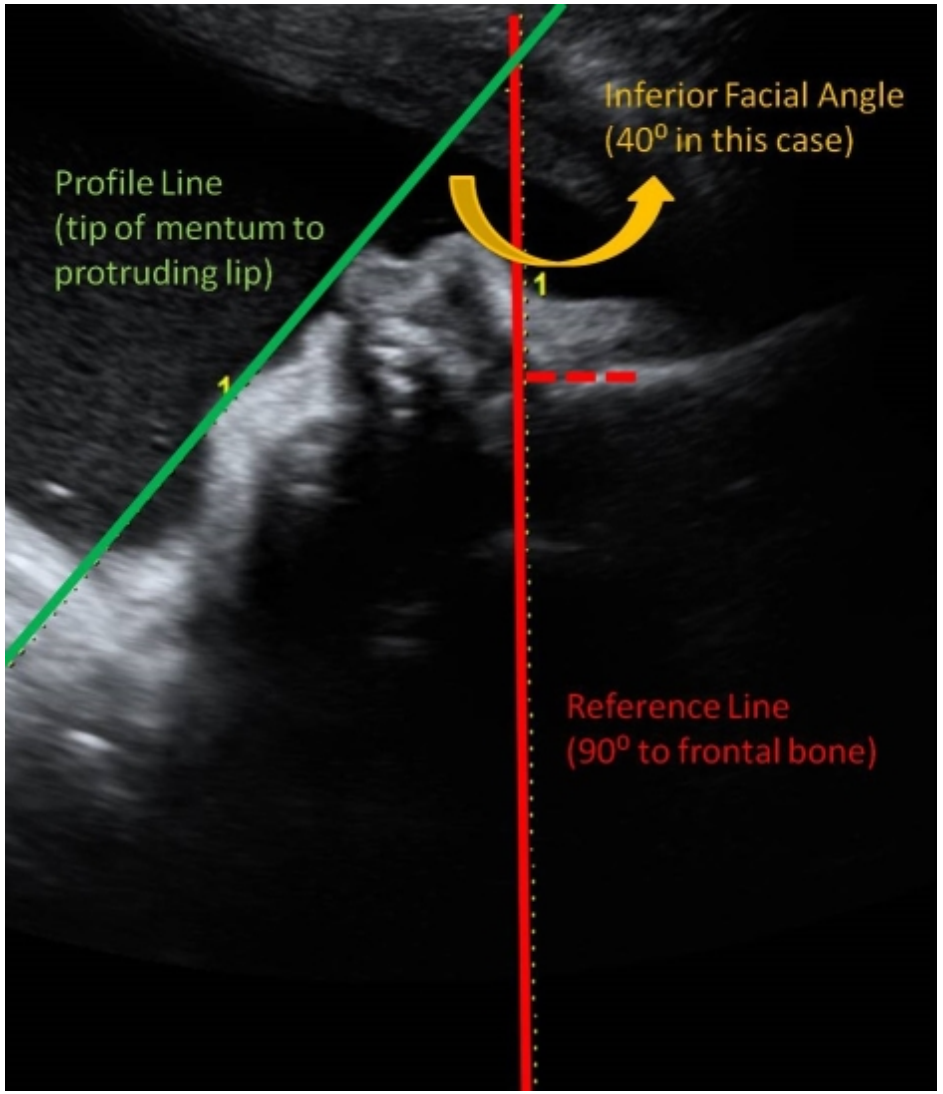
Part 2 – Case Management

Fetal echocardiogram demonstrated a structurally normal heart with an abnormal cardiac axis over 90 degrees (normal 28-59 degrees). A mediastinal mass was suspected in the fetus as well, but it was hard to differentiate from a normal thymus given the abnormal heart positioning. After a discussion of these findings, the patient agreed to an amniocentesis. Amniotic fluid Fluorescent In Situ Hybridization (FISH) results were normal. Fetal karyotype (Image 7) was abnormal, with a large portion of extra genetic material on chromosome 1, reported as 46, XX, der (1) t (1;7) (q44;q22). This is essentially a diagnosis of trisomy of the terminal portion of chromosome 7 attached to chromosome 1. Karyotypes of both parents were tested to evaluate for a possible balanced translocation, and both results were normal, suggesting that the fetal findings likely reflected a spontaneous, de novo translocation. The recurrence risk is considered to be about 1% in a future pregnancy.

Part 2 – Case Management

There was discussion about a possible ex utero intrapartum treatment procedure (EXIT), but it was felt that this was not necessary in a term gestation with normally-sized fetal lungs. After spontaneous onset of labor, the patient delivered via spontaneous vaginal delivery a female infant without maternal complications. Total length of rupture of membranes was 90 minutes and the mother received antibiotic prophylaxis for Group B streptococcus colonization. Neonatal Apgar scores were 1, 1, 1, and 8 at 1, 5, 10 and 15 minutes of age, respectively. Attempts at neonatal intubation were unsuccessful due to micrognathia and ankylosis of the jaw preventing opening of the infant mouth. A laryngeal mask airway was placed to stabilize the infant for transport to a local's children's hospital where tracheostomy was performed. In addition to micrognathia, other findings included cleft palate, low set ears, and sacral tuft of hair, The neonatal course was complicated by early-onset E. coli sepsis, bilateral cephalohematomas, need for gastrostomy for feedings, and a 2-month hospitalization.

Image 4 – Fetal Inferior facial angle

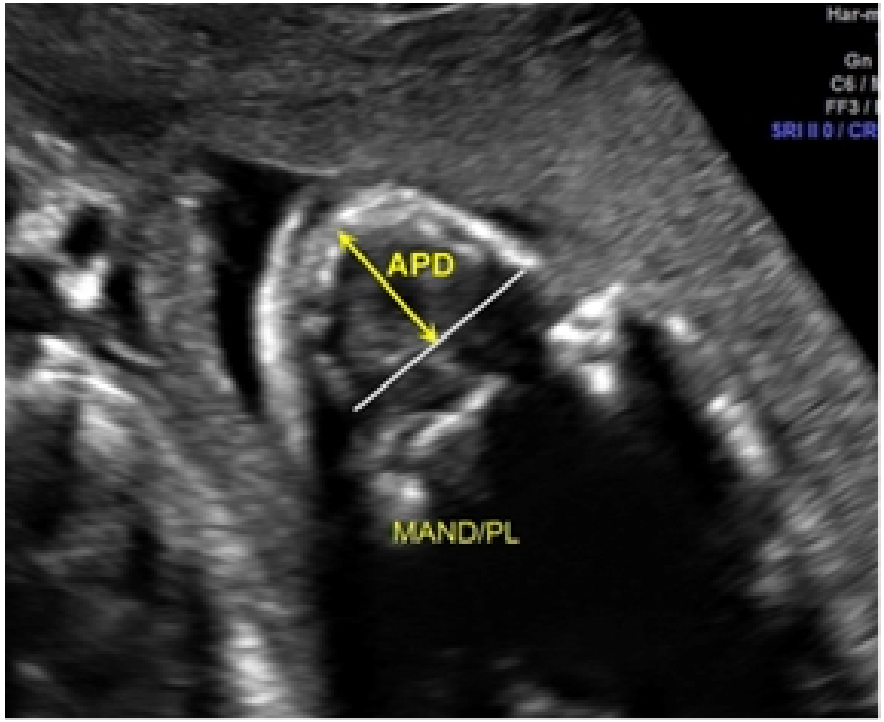


Ultrasound images courtesy of:

Ann Raikula, RDMS & Crystal Holt-Ayers, RDMS

St. Luke's Hospital
Kansas City,
Missouri (USA)

Image 5 – Fetal Receding Chin

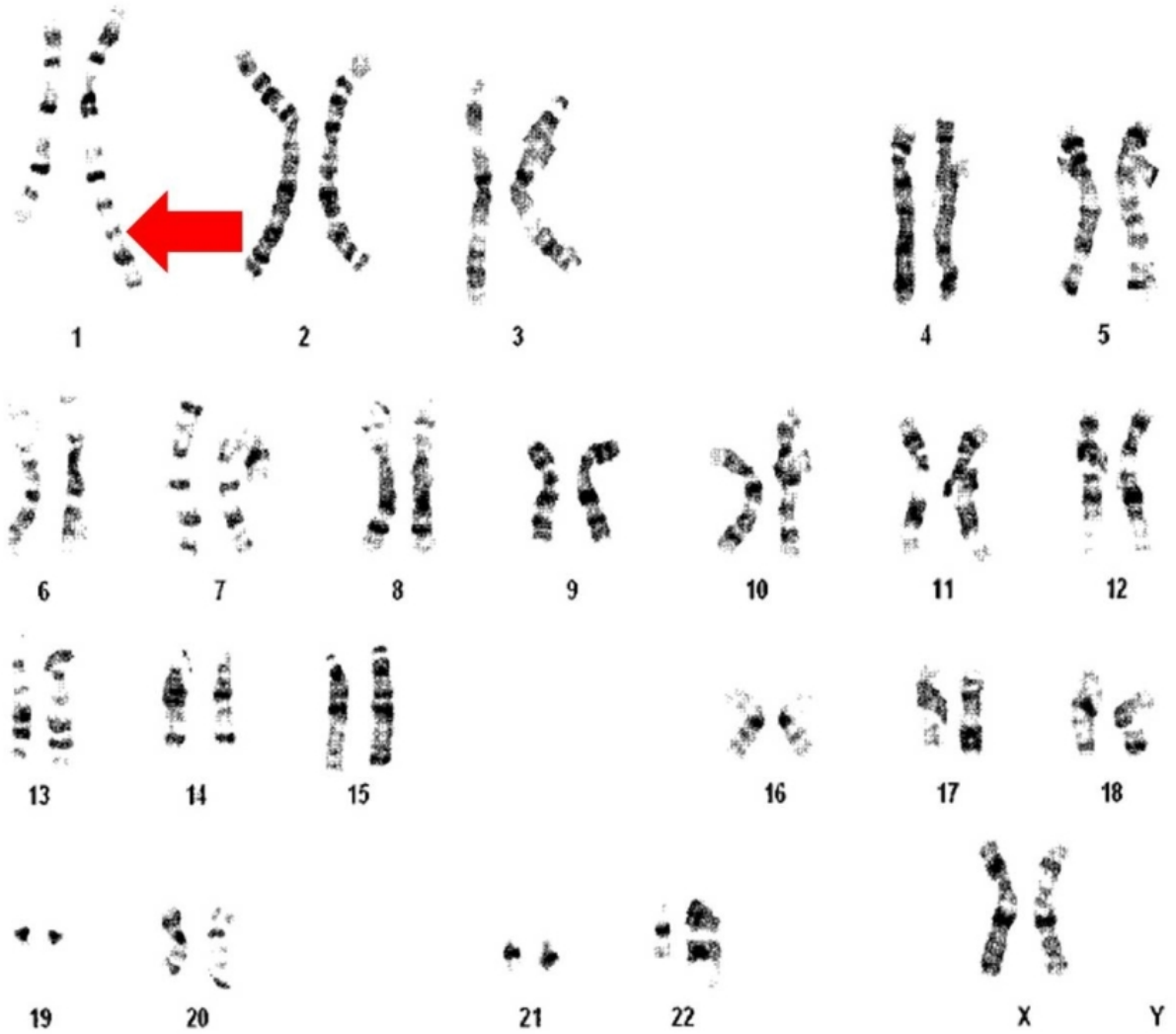


Ultrasound images courtesy of:

Ann Raikula, RDMS & Crystal Holt-Ayers, RDMS

St. Luke's Hospital
Kansas City,
Missouri (USA)

Image 6 – Fetal Karyotype




MEDNAX
HEALTH SOLUTIONS PARTNER
Summary &
Review of Literature

Summary & Review of Literature

Micrognathia and Retrognathia: Definitions and Diagnosis:

Micrognathia refers to a small mandible (chin). In contrast, retrognathia refers to malocclusion due to abnormal posterior positioning of the normally-sized mandible (Callen, 2008).

There are nearly a dozen different descriptions in the literature to classify fetal chin and profile disorders (Luedders et al., 2011). However, in practice, only 2 measurements needed for accurate prenatal diagnosis of micrognathia and retrognathia: the Inferior Facial Angle (IFA) and the Jaw Index. These measurements are readily obtained from standard 2D views, the midsagittal profile view (Figure 4) and the mandible view (Figure 5), both of which are part of the standard fetal anatomy survey (CPT code 76811).

The IFA is measured as shown in Image 4, the angle of the line orthogonal to the vertical part of the forehead at the level of the synostosis of the nasal bones (reference line) and a second line joining the tip of the mentum and the anterior border of the more protruding lip (profile line). An IFA below 50 degrees defines a receding chin with a sensitivity of 1.0, a specificity of 0.989, a PPV of 0.750, and a NPV of 1.0 (Luedders et al., 2011; Rotten et al., 2002). A receding chin may reflect either micrognathia (small mandible) or retrognathia (posteriorly displaced mandible of normal size) or both.

Summary & Review of Literature

The Jaw Index is obtained using the transverse view of the fetal mandible and measuring the anterior-posterior jaw length (shown in Figure 5 as APD). The Jaw Index is calculated as APD divided by BPD (biparietal diameter) multiplied by 100 (Palladini et al., 1999; Morris et al., 2009). In a population of 262 normal fetuses, the 5th percentile of Jaw Index was 24. To diagnose micrognathia, a Jaw Index less than 24 had sensitivity of 1.0, specificity of .98, PPV of .69 and NPV of 1.0. (Paladini et al 1999).

Both IFA and Jaw Index remain fairly constant across gestational ages from 18 weeks and beyond, so there is no reason to have gestational age specific cut-offs.

A Jaw Index less than 5th percentile (less than 24) in combination with indirect evidence of aerodigestive tract obstruction (such as polyhydramnios, glossoptosis, or absent stomach bubble) is considered severe and has been suggested as an indication for an EXIT (ex utero intrapartum treatment) procedure (Morris et al, 2009), although this is not yet standardized (Morris et al., 2009).

Summary & Review of Literature

Associated Anomalies and Prognosis:

Both micrognathia and retrognathia are frequently associated with abnormal karyotype and various syndromes (Callen, 2008; Luedders et al., 2011). In a series of 58 cases diagnosed prenatally by small IFA, aneuploidy was present in 35%, musculoskeletal disorders in 43%, and non-skeletal anomalies in 15%. Pregnancy was terminated in 33 cases. Among the 25 ongoing cases, there were 5 antepartum stillbirths (20%), 4 intrapartum deaths (16%), and 16 live births (64%), of whom 3 died postnatally.

Evaluation for aneuploidy and microduplications and deletions in cases with structural fetal anomalies has become more complex with the introduction of cell-free DNA (cf-DNA) screening from maternal blood. It is important to point out that cf-DNA would likely have been normal in this case and would have provided false reassurance to this couple. Indeed, a recent review indicated that cf-DNA may miss over 20% of fetal chromosomal problems when replacing traditional karyotyping in high risk pregnancies (Petersen, Vogel, Ekelund, Hyett, and Tabor, 2014). This is due to the design of NIPT to detect common trisomies of 21, 18, and 13 with a lack of precision for complex chromosomal abnormalities that can occur in a fetus. Therefore, ACOG and SMFM (2016) recommend definitive prenatal diagnostic testing using chromosome microarray (sample obtained via amniocentesis or chorionic villus sampling) when fetal structural anomalies are detected. Patients should be counseled that normal cf-DNA screening does not exclude complex and clinically significant chromosomal problems in the fetus in over 20% of cases where the fetus has such a diagnosis.

Summary & Review of Literature

Partial Trisomy 7

Based on literature reports of previous cases of partial Trisomy 7, the parents were counseled that the prognosis is somewhat guarded. The condition is associated with high rates of intellectual disability and immunocompromise. Multiple congenital anomalies are common including growth restriction, abnormal skull including frontal bossing, microcephaly, hypoplastic nose, low set ears, microretrognathia, strabismus, down slanting palpebral fissures, short neck and sternum, kyphoscoliosis, hip dysplasia, skeletal anomalies, cleft or high arched palate, laryngeal abnormalities, congenital heart disease, kidney and genitourinary malformations, and brain anomalies.