Objectives
The aim of this study was to measure bladder volume by 3D ultrasonography to establish a correlation between urine production rate (UPR) with amniotic fluid index (AFI) and peak systolic velocity (PSV) of the renal artery.

Methods
We collected 121 cases of normal singleton pregnancy without medical or obstetric complication. The gestational age was between 20 and 38 weeks of gestation. The method to obtain volume measurement from 3D volume datasets was VOCAL (Virtual Organ Computer aided Analysis, GE Medical System, Zipf, Austria). To calculate the rate of fetal urine production, we measured bladder volume at intervals of 5 min following this formula:

Urinary production rate (UPR) (mL/h) = \[(\text{second bladder volume} - \text{first bladder volume}) \times \frac{60}{x}\]

where \(x\) is the time interval in mins between bladder volume measurements. For each case we considered also 2D ultrasonography to evaluate fetal biometry, AFI, Doppler measurements (resistance index RI, peak systolic velocity PSV of renal artery).

Results
The mean of UPR rate was 3.53 ml/h in accordance with the data of literature. Considering the Doppler measurements taken for each patient, we demonstrated the correlation between UPR and both RI and PSV of renal artery (\(p<0.05\)). We couldn’t find out a significative relation between UPR and amniotic fluid index AFI (\(p=0.750\)).

Conclusion
Measurement of fetal urine production may be an alternative to AFI or single deepest pocket and might provide an alternative to amniotic fluid volume measurement as a mean of evaluating the possibility of fetal hypoxia.