Anorectal malformations present with an incidence of 2.0 to 2.5 per 10,000 live births. These lesions have variable clinical presentations ranging from low to complicated high lesions. The low anorectal malformation lesions may be managed by single-stage surgical correction, but the complicated or high lesions need to be managed with multi staged operations. These surgical reconstructive procedures are associated with morbidity and mortality. The associated VACTERL (vertebral, anorectal, cardiac, tracheoesophageal, renal, and limb) anomalies if present, further add to the existing morbidity and mortality, associated with surgical reconstruction.

Of these VACTERL anomalies, genitourinary lesions are a frequent cause of significant morbidity and mortality. These genitourinary anomalies include both structural and functional lesions. The genitourinary anomalies occur frequently in patients with anorectal malformation and retrospective reviews report incidence of 20 to 50%.[2]

Improper management of these genitourinary anomalies leads to unnecessary loss of therapeutic outcome and compromised result. This prospective study was done on ninety patients of anorectal malformations who presented to Institute of Government General Hospital / Guntur Medical College, Guntur from September 2014 to March 2017. This study was done to note the association of different types of urogenital anomalies in anorectal malformations.

To evaluate the incidence of association structural and functional genital and urinary anomalies in anorectal malformations. This prospective study was done with an aim to evaluate the incidence of urogenital anomalies associated with anorectal malformations.
Materials and Methods
The present prospective study was done in a single unit on ninety patients with anorectal malformation, who presented for review to Government General Hospital/ Guntur Medical College, Guntur from September 2014 to March 2017. Of these, 52 were male and 38 were female patients. All patients underwent a detailed clinical examination, evaluation and management which were done in the neonatal period. The associated urogenital anomalies were noted.
The anorectal malformations were classified according to Wingspread classification into low, intermediate, and high anomalies.
The radiology workup for every case include X-ray babygram, invertogram, lateral plain X-ray of lumbosacral spine, echocardiography, ultrasonogram of abdomen (Essota color Doppler A.S. machine with 3.5MHz convex probe and 7.5 MHz high resolution linear probe) and VCUG (voiding cystourethrogram). VCUG was done in 87 patients except for 3 patients with cloacal anomaly who underwent genitogram and panendoscopy. Bladder capacity was calculated by the formula weight in Kg x 7 = bladder volume in ml Under aseptic precautions a 6Fr infant feeding tube is passed per urethra. Required volume of 76% of urograffin one in three dilutions in required quantity was instilled in to the bladder and a radiograph was taken during micturation.

Grading of VUR (vesicoureteric reflux)
This was done according to international classification.
Grade I: Reflux into non-dilated ureter
Grade II: Reflux into renal pelvis and calyces without dilatation
Grade III: Reflux with mild-to-moderate dilatation and minimal blunting of fornices
Grade IV: Reflux with moderate ureteral tortuosity and dilatation of pelvis and calyces
Grade V: Reflux with gross dilatation of ureter, pelvis, and calyces, loss of papillary impressions, and ureteral tortuosity

The patients with normal ultrasonogram but with reflux on VCUG were noted. All children with VUR and genitourinary malformations were treated by standard protocol. The structural and functional genitourinary anomalies were in particular analyzed in an elaborate manner. The genital anomalies were diagnosed by physical examination, followed by imaging studies when needed. These patients were followed in outpatient department. The observations and results of the patients were tabulated and analyzed.

Observation and Results
From September 2014 to March 2017 90 cases of anorectal malformations were studied and evaluated for associated anomalies. The following parameters were tabulated and analyzed. There were 52 (57.77%) male patients and 38 (42.22%) female patients.

Table 1: Age at presentation

| Age (D-Days) | Number | Percentage |
|--------------|--------|------------|
| <D1          | 58     | 64.44%     |
| D2           | 08     | 8.89%      |
| D3           | 08     | 8.89%      |
| D4           | 3      | 3.33%      |
| D5           | 7      | 7.78%      |
| D6           | 0      | 0%         |
| >D7          | 6      | 6.68%      |

Most of our patients presented within first 24 hours of life. Patients who presented after 72 hours were either female patients with anovestibular malformation or male patients with anocutaneous fistula.

Table 2: Level of anorectal malformation

| Level of anorectal malformation | Number | Percentage |
|---------------------------------|--------|------------|
| Low                             | 30     | 33.33%     |
| Intermediate                    | 22     | 22.44%     |
| High                            | 38     | 42.22%     |

High anomalies are the most common anorectal malformation in this study.
Cardiac and Urological abnormalities are the most common associated anomalies with anorectal malformation. In this study we have performed ultrasound in all and voiding cystourethrogram in 87/90 patients. In 29 patients ultrasound was abnormal. VCUG was abnormal in 25 patients.

By Ultrasound 29 (42 renal units) had urologic anomalies. 20 renal units had hydronephrosis, followed by hydroureteronephrosis in 9 renal units. Other anomalies detected were renal agenesis, dysplastic kidney, ectopia and duplex.

38 units of VUR were detected by VCUG. 94.7% were high grade VUR. Grade V VUR was bilateral in 14 patients and unilateral in 8 patients. In 10 patients the ultrasound was normal but MCUG detected VUR. 6 patients with high ARM who had normal ultrasound were detected with VUR. The other 4 patients had Intermediate ARM.

Discussion
Urinary tract abnormalities are the most common associated anomaly in patients with ARM and have been reported in 26 to 52% of several large series [1]. Its incidence is higher in infants with a high versus a low anomaly and boys are more prone than girls to have an urologic anomalies [2]. A Tohda et al. found urogenital anomalies in 38.1% of low, 65.5% of intermediate and 85.7% of high ARM. Srivastava et al. found urogenital anomalies in 16, 2% of low, 22.54% of intermediate and 68.75% of high ARM [3].

About 43.33% of our cases had urinary tract anomalies with preponderance to high level ARM. Our study shows 16.67% of low, 4.44% of intermediate and 22.22% of high ARM to have associated urogenital anomalies.
VUR and renal agenesis are the most common associated urinary tract anomalies with imperforate anus \cite{4,1}. Associated urologic anomalies in 25.6\% and genital anomalies 14\% were found Boemers found VUR in 32\% and 27\% of their cases respectively \cite{1}. Misra et al. reported that 37.5\% of patients with low deformity had VUR, but Rattan and Srivastava reported the incidence of VUR only in 1.7\% and 5\% of their patients \cite{6}. This wide variation in incidence of VUR is related to the differences in the method of evaluation. In some studies VCUG was performed only when sonographic findings were abnormal \cite{3}.

In our study USG abdomen and VCUG was performed on all patients. In 43.33\% of patients USG was abnormal. VCUG was abnormal in 28.73\% of patients; the commonest anomaly detected in our study was VUR. 38 units of VUR were detected by VCUG 94.7\% were grade Sin 10 patients the USG was normal but VUR was detected on VCUG. Grade 5 VUR was commonly detected. Six patients with high ARM who had normal USG were found to have VUR \cite{3}.

Conclusion

A better understanding of pathogenesis with more accurate pre- and intraoperative diagnosis together with continuous perfectible practice of established operative techniques appear to be the keys to success in ARMs management, aligning our team experience and expertise toward reputed centers. We support a multidisciplinary approach to these cases, using complex teams that include neonatologists, paediatrics, surgeons, paediatricians, psychologist and family doctors, together with a monitored transition towards adult gastroenterology centers.

Acknowledgement
The authors thankful to Department of Paediatrics and Surgery for providing all the facilities to carry out this work.

Conflict of Interest: None

Ethical approval: Taken from Institutional Ethics Committee.

References
1. Boemers TM, Beek FJ, van Gool ID et al. Urologic problems in anorectal malformations. Part 2: Functional urologic sequelae. J Paediatri Surg. 1996; 31:634-637.
2. Jaramillo D, Lebowitz RL, Hendren WH. The cloacal malformation: radiologic findings and imaging recommendations. Radiology. 1990; 177(2):441-8.
3. Mo R, Kim JH, Zhang J, Chiang C, Hui CC, Kim PC. Anorectal malformations caused by defects in sonic hedgehog Signaling. The American journal of pathology. 2001; 159(2):765-74.
4. Stoll C, Alembik Y, Dott B, Roth MP. Associated malformations in patients with anorectal anomalies. European journal of medical genetics. 2007; 50(4):281-90.
5. Peña A, Hong A. Advances in the management of anorectal malformations. The American journal of surgery. 2000; 180(5):370-6.
6. Misra D, Mushtak I, Dpake DP, Kiely EM, Spitz L. Associated urological anomalies in low imperforate anus are capable of causing significant Morbity. J Urol. 1996; 48:281-3