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RADIOLOGICAL EVALUATION OF SPINAL DYSRAPHISM USING MRI

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ABSTRACT

Aims and objectives: To assess the role of MRI in
• The identification of various forms of Spinal dysraphism.
• Characterization of the lesions and associated anomalies.
• Giving a composite diagnosis based on specific Imaging findings.

Materials and methods: A total of 20 patients who were suspected to have spinal dysraphism clinically and referred for MRI Spine were imaged with 1.5 Tesla MRI Scanner, Siemens magnetom avento Syngo (MR D-13) 16 channel machine in the department of Radiodiagnosis.

It was an observation study & a total of 20 patients fulfilling the selection criteria were studied Clinically the most common cause for referral was swelling in the back predominantly in Lumbosacral region. The other symptoms were sensory/motor deficit, bladder/ bowel disturbances, spinal curvature deformities, cutaneous features like dermal dimple, hypertrichosis, dermal sinus and capillary hemangioma etc.

Results: The most common type of spinal dysraphism is open spinal dysraphism accounting for 80% of the total 20 cases. The most common open spinal dysraphism is Myelomeningocele accounting for 81.25% of the total 16 cases followed by myelocele.Occult spinal dysraphism accounted for 20% of the total 20 cases. The most common type of occult spinal dysraphism is Spinal lipoma accounting for 50% of the total 4 cases.

Conclusion: MRI is the imaging modality of choice for evaluation of the soft tissue anomalies of Spinal dysraphism especially spinal cord anomalies.
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Key Words: *Menigocoele, myelomeningocoele, sacral agenesis, myelocoele.*

INTRODUCTION:-

Spinal dysraphism is the most common Neural tube defect in developing countries like India.
Spinal dysraphism is a broad term encompassing a heterogeneous group of congenital spinal anomalies, which results from defective closure of the neural tube during early fetal life.
MRI is the imaging modality of choice for characterizing the soft tissue spinal anomalies of Spinal dysraphism especially spinal cord.
Meningomyelocele, Myelocele and Meningocele are evaluated according to the signal characteristics of their contents. Spinal Lipomas are best characterized using Fat Suppression Sequences. MRI best characterizes tethering of cord, spinal curvature anomalies, Chiari malformations, Hydromelia and Hydrocephalus.
MRI also plays an important role in the postoperative follow-ups.

MATERIALS AND METHODS :-

The study comprises of 20 patients including 11males and 9females, age ranging from birth to 30 years. The study was conducted from May 2022 to March 2023 in , ASRAM Medical college, Eluruin co-ordination with departments of Neurosurgery and Paediatrics of the same institute.

Clinically the most common cause for referral was swelling in theback predominantly Lumbosacral region. The other symptoms were sensory/motor deficit, bladder/ bowel disturbances, spinal curvature deformities, cutaneous features like dermal dimple, hypertrichosis, silky hair, dermal sinus and capillary hemangioma.

Imaging technique and procedure:-

MRI was performed using 1.5 Tesla super conducting SIEMENS MAGNETOM symphony

LUMBAR SPINE
1. Sagittal fast spin echo, T1-weighted image from conus to S1.
2. Sagittal fast spin echo T2-weighted image.
3. Axial fast spin echo T2-weighted image

DORSAL SPINE
1. Sagittal T1-weighted sequence including the entire Dorsal spine.
2. Sagittal fast spin echo T2-weighted sequence including the entire dorsal spine
3. Axial T2-weighted sequence including the entire Dorsal spine

CERVICAL SPINE
1. Sagittal fast spin echo, T1-weighted image including from the cerebellar tonsils to D1
2.Sagittal fast spin echo T2-weighted sequence including from the cerebellar tonsils to D1.
3.Axial 2D GRE covering C1-C7
HASTE MYELOGRAM

MRI diagnostic criteria
Signal Intensities of lesion in T1-W, T2-W and FLAIR SEQUENCES
• CSF Intensity –Meningocele.
• CSF Intensity+Neural tissue-Myelomeningocele.
• Neural tissue-Myelocele.
• Fat intensity+neural tissue-Lipomyelocele.
• Fat intensity+CSF intensity + neural tissue-Lipomyelomeningocele.
• Fat intensity-Intradural lipomas, Filar lipomas
Septum In Diastemetamyelia• Bony• Fibrous
Tethering of cord
Vertebral anomalies
Spinal distribution
Spinal curvature anomalies
Chiari association
Hydromyelia
Hydrocephalus

RESULTS AND DISCUSSION:-

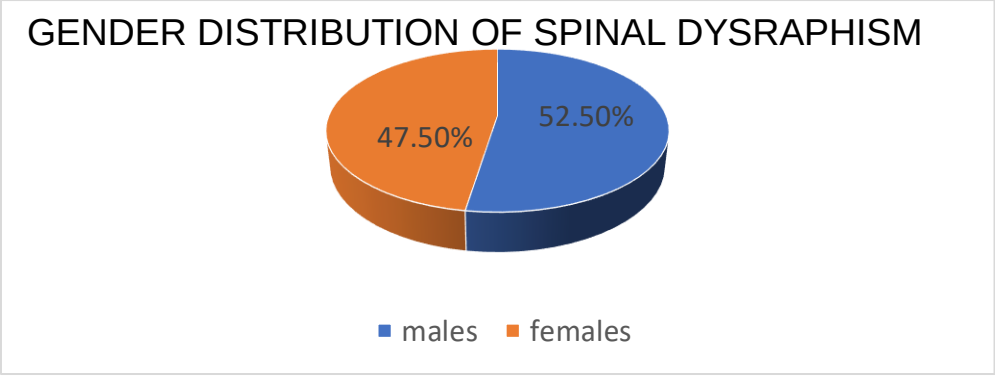


Figure 1(a) distribution of spinal dysraphism based on gender

Out of 20 patients 11 were male and 9 were female.

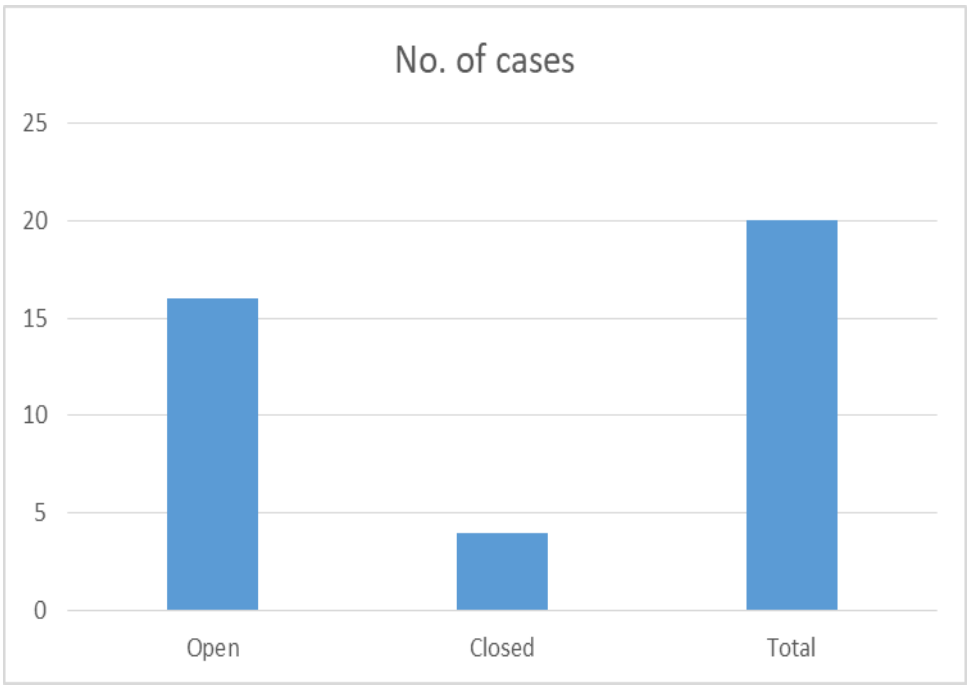


Figure 1(b) distribution of spinal dysraphism based on type.

Out of 20 patients 16 were open spinal dysraphisms and 4 were closed spinal dysraphisms.

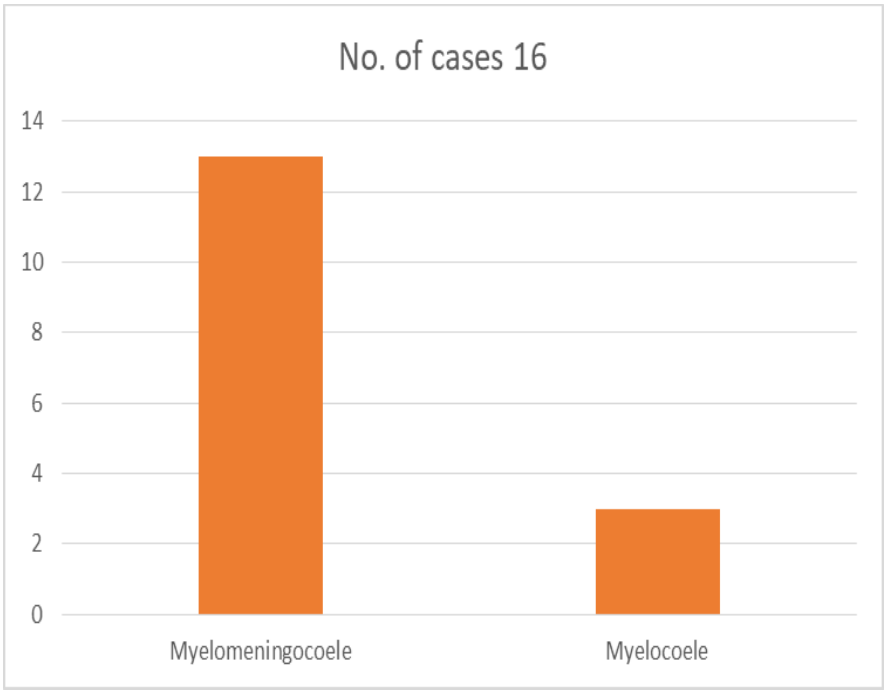


Figure 1(c) distribution of open spinal dysraphism based on type.

Out of 16 patients 13 were myelomeningocoele and 3 were myelocoele.

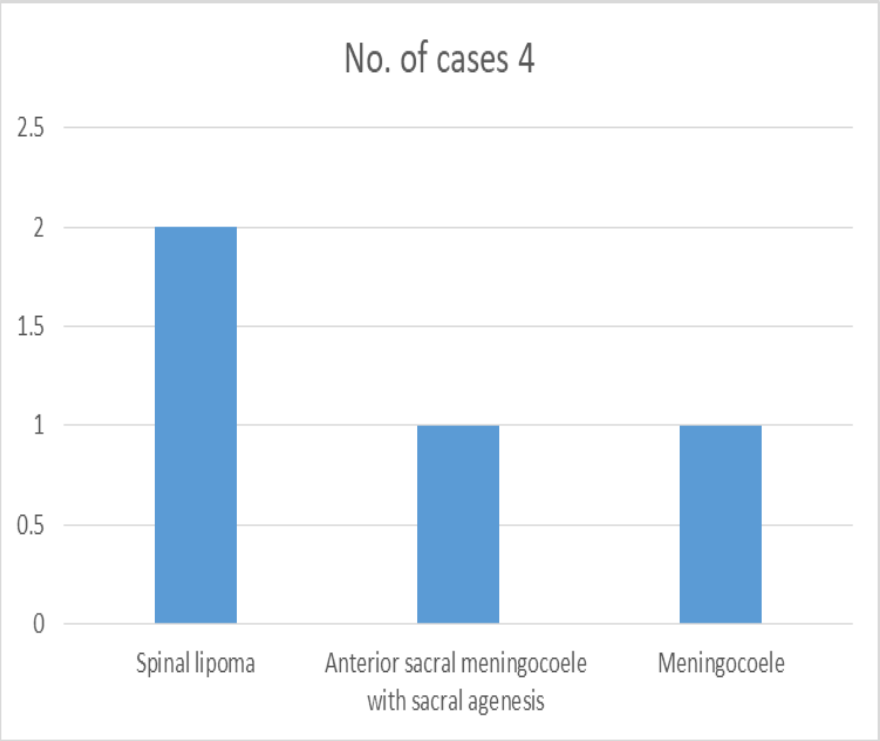


Figure 1(d) distribution of closed spinal dysraphism based on type.

Out of 4 patients 2 had spinal lipoma 1 had anterior sacral meningocoele with sacral agenesisand 1 was meningocoele.

CASE-1: A 36 year female presented with bladder and bowel incontinence since 2 years.

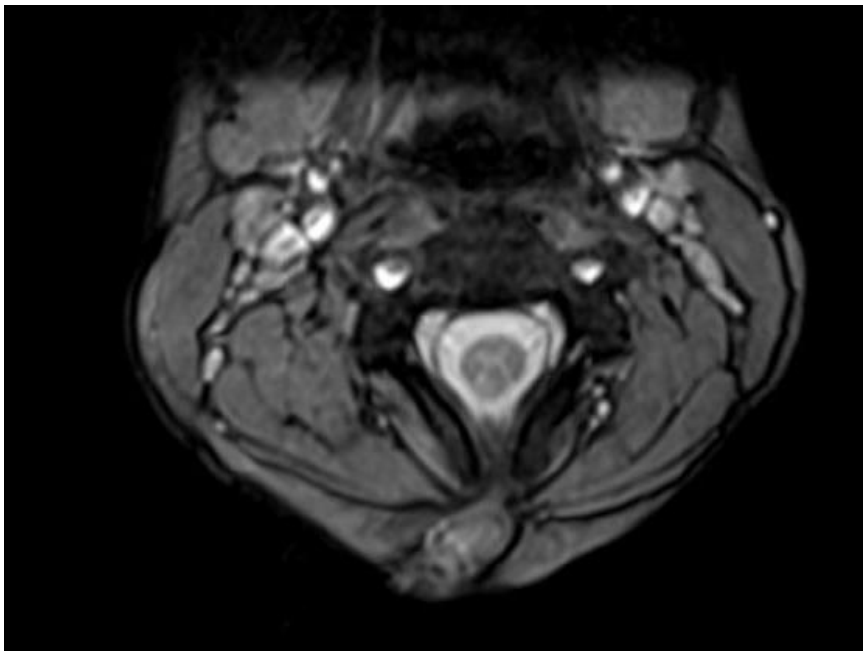
Figure 2: Anterior sacral meningocoele secondary to sacral agenesis from S2 to S5 vertebrae.

Low lying cord ending at L3 level

CASE-2 A 11 year female presented with swelling in lower back since birth

Figure 3: Lipomyelomeningocoele with defect in lumbosacral region, widening of spinal canal, tethering of low lying cord and rotation of neuronal placode to left.

CASE-3 A 13 Year male with pain at nape of neck radiating to right forearm since 3 years.



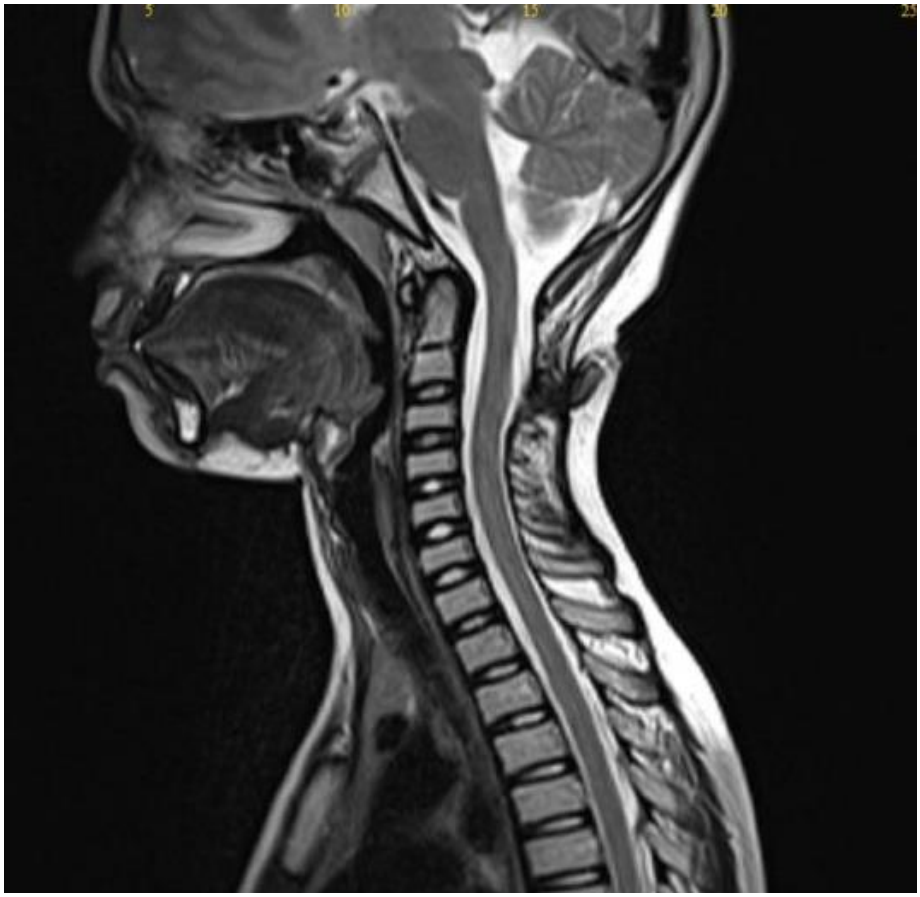


Figure 4: Open spinal dysraphism with cervical myelomeningocoele at C2 level.

CONCLUSION:-

MRI is the imaging modality of choice for characterizing the anomalies of spinal cord and associated soft tissues in spinal dysraphism. MRI clearly identifies and characterizes the nature of neural tissue protruding through the dysrasphic spine in Meningomyelocele,Myelocele And Meningocele.Spinal cord lipomas are best characterized by fat suppression sequences.MRI characterizes the location,extent,direction of Dorsal dermal sinus and associated Dermoid/Epidermoid. MRI plays an important role in the characterization of Diastematomyelia into split cord malformation I and II based on the type of septum and nature of dural covering. Size, extent and site of rejoining of the hemicords are best depicted in coronal plane. Fibrous septum is best depicted in MRI while bony septum is best recognized in CT. MRI is the investigation of choice in diagnosing Tight filum terminale syndrome and other causes of tetheringChiari malformations, Hydomyelia and Hydrocephalus are best detected by MRI. Spinal curvature anomalies are well studied by MRI due to its inherent multiplanar capability. MRI best characterizes caudal spinal anomalies.

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