Original Research Article

MRI in Cerebellopontine angle and internal auditory canal lesions

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Abstract

Background: A large variety of inflammatory and neoplastic lesions are known to occur within internal auditory canal and cerebellopontine angle. Imaging techniques are now available to guide the search for the underlying cause of most patient complaints. The advent of MRI has revolutionized the medical diagnostic imaging because it allowed tissue characterization of many lesions. High resolution MRI scan is highly sensitive in detecting lesions of internal auditory canal and cerebellopontine angle**.** More recently, diffusion imaging is playing a substantial role in evaluation of CPA masses. High ADC values of solid vestibular schwannomas were in conformity with increased diffusion rates, indicating the presence of increased amounts of extracellular water (a relatively loose tissue in tumor matrix). This study was undertaken with purpose to present MRI findings in cases of CPA and IAC lesions and to assess the impact of MRI on the diagnosis management and follow up, after treatment, of these lesions with an attempt to compare MRI findings with operative and H/P findings in the cases where surgery was done.

Materials and methods: The present study was conducted in Post Graduate Department of Radiodiagnosis, Government Medical College, Srinagar on patients presenting with otoneurological signs and symptoms suggestive of CP angle and IAC lesions referred for MR imaging by various departments of GMC Hospital Srinagar during the one year period of study.

Results: Majority of lesions found in this study were tumors (33 lesions), next common in our series were inflammatory lesions and vascular lesions (4 each case). Among all lesions and tumors most common MR diagnosis in our study was acoustic neuroma 20 of 41 lesions (48.78%) and 20of 33 tumors (60.60%) respectively. Next common among tumors was meningiomas 3 out of 33 cases (9.09%).

Conclusion: The results of the present study concluded that, MRI has particular advantages over CT for study of internal auditory canal and cerebellopontine lesions because it is non-ionizing investigation, better soft tissue contrast and resolution, multiplanar capability permits more reliable distinction of lesions, better identification of structures involved by lesions, tissue characterization of lesions and absence of beam hardening artifacts makes MR imaging superior ion evaluating the lesions in CP angle and IAC. The radiological features of various lesions are often sufficiently distinctive to permit a specific diagnosis to be made. MR imaging due to its multiplanar capability helps in knowing the exact site and extent of these lesions. MRI shows inflammatory and vascular lesions with exquisite detail and is better for detection of such lesions as compared to CT. MRI allows a confident perspective pathologic diagnosis to be made (Using FSE T2 weighted images, diffusion imaging, SE images, thin section post gadolinium scans) and this predictive value far exceeded the CT.

Key words

Cerebellopontine angle, Internal auditory canal, Lesions.

Introduction

The term cerebellopontine angle was introduced in 1902 by Henneberg and Koch when they reported two individuals with bilateral acoustic neuroma occurring in location they described in German kleinhirnbruchenwinkel (kleinhirn= cerebellum, bruchen= pons or bridge and winkle = angle [1]. A wide variety of lesions may occur in this region and clinical diagnosis is often difficult due to the similarity of signs and symptoms produced by many of these lesions [2]. It is the auditory component that draws the most attention in the imaging world because the radiological search for cause of sensorineural hearing loss (SNHL) is generally more fruitful than the search for causes of vertigo and disequilibrium.

MR has become the method of choice to look for neurovascular conflicts in patients presenting with fluctuating SNHL and vertigo. The conflict is most often caused by arteries or veins, compressing the vestibulocochlear nerve Simultaneous visualization of nerves and vessels is only possible on MR .An additional MR angiography sequence is used when vascular compression is suspected as a cause of vertigo or other symptomatology [3].

A large variety of inflammatory and neoplastic lesions are known to occur within internal auditory canal and cerebellopontine angle. Imaging techniques are now available to guide the search for the underlying cause of most patient complaints. The advent of MRI has revolutionized the medical diagnostic imaging because it allowed tissue characterization of many lesions [4]. A major fraction of lesions at CP angle and internal auditory canal is formed by tumors. Acoustic neuromas comprise 80-90% of lesions, the largest fraction of the remainder are meningiomas followed epidermoids, lipomas, metastasis and a wide variety of uncommon lesions. MRI has changed clinical presentation of acoustic nerve tumors as tumors are now detected even when they are small. MR imaging reveals the soft tissues of cerebellopontine angle and internal auditory canal with such amazing accuracy that has made it, more likely, the choice of investigation [6]. High resolution MRI scan is highly sensitive in detecting lesions of internal auditory canal and cerebellopontine angle [7].

Further, high resolution T2- weighted fast spin echo images can be used to define on which nerve branch (cochlear, inferior or superior vestibular, facial) the schwannoma is located. Today, the MRI with gadolinium–enhanced pulse sequence of the brain is the gold standard for the diagnosis of vestibular schwannoma. A good understanding of the pathophysiology of the vestibular and auditory system and the clinical conditions that cause dysfunction in these two systems helps in the process [4]. More recently, diffusion imaging is playing a substantial role in evaluation of CPA masses.

High ADC values of solid vestibular schwannomas were in conformity with increased diffusion rates, indicating the presence of increased amounts of extracellular water (a relatively loose tissue in tumor matrix). This study was undertaken with purpose to present MRI findings in cases of CPA and IAC lesions and to assess the impact of MRI on the diagnosis management and follow up, after treatment, of these lesions with an attempt to compare MRI findings with operative and H/P findings in the cases where surgery were done.

Materials and methods

The present study was conducted in Post Graduate Department of Radiodiagnosis, Government Medical College, Srinagar on patients presenting with otoneurological signs and symptoms suggestive of CP angle and IAC lesions referred for MR imaging by various departments of GMC Hospital Srinagar during the one year period of study.

Before evaluating a patient by MR imaging informed consent was obtained from the patient. A detailed enquiry was made regarding the possibility of any contraindication to MR imaging like aneurismal clips, metallic implants, pacemakers etc. Patient were counseled about scanning technique, description of the magnetic tunnel, expected duration of examination and the noise that will be generated during scanning.

A detailed clinical and MRI examination was carried out and details were entered into a preformed proforma with demographic details of the patients including their medical histories, Systematic examination, Otoneurological examination, and Investigations which included Hb. TLC, DLC, ESR, routine Urine examination. CSF analysis, Pure tone audiometry and Plain x ray skull. The proforma had a section for writing the clinical findings of the MRI. A history of claustrophobia was asked and sedation was done it required during scanning. All metallic things like coins, nails, any garment with metallic buttons were removed from the patient. All the patients were imaged on Siemens Magnetom Symphony 1.5 tesla helium cooled superconducting MR scanner. Dedicated head coils were used for multiplanar imaging of the CP angle and internal auditory canal. MR imaging was performed in various orthogonal planes with following sequences:

- T1-weighted: coronal and axial (TR 495 msec, TE 13 msec, BW 80, FOV 187x230, slice thickness 5 mm). sagittal (TR 400 msec, TE 97 msec, BW 135, FOV 230x230, slice thickness 5mm)
- T2- weighted: coronal, axial and sagital (TR 5520 msec, TE 104 msec, BW 200, FOV 194x230, slice thickness 5 mm).
- T2 –weighted FSE: (TR 6990 msec, TE 135msec, BW 130, FOV 199x250, slice thickness 2.5 mm).
- T1-weighted SE post contrast: (TR 525msec, TE 17msec, BW 130, FOV 201x203, slice thickness 5 mm).
- T1-weighted post contrast (thin slice); axial and coronal (TR 450 msec, TE 15msec, BW 130, FOV 175x200, slice thickness 3 mm).
- T1 –weighted post contrast TWT SE Sagital (TR 525 msec, TE 17msec, BW 130, FOV 230x230, slice thickness 5 mm).
- Special sequence like FLAIR, TOF angiography, sequences for diffusion imaging etc. were used where ever necessary.

Plain imaging was followed by intravenous contrast study on T1- weighted spin echo and thin section (3 mm). T1 –weighted imaging using intravenous gadolinium –DTPA. The dose of contrast was 0.1 mmol/kg of body weight. MR image morphology was then evaluated under the supervision of senior examiner and a differential diagnosis was framed on the basis of clinical suspicion, age of patient, site and extent of lesion, diagnostic appearance, signal intensity and contrast enhancement pattern on the lesion.

Results

We evaluated patients with clinical signs and symptoms of CP angle and IAC lesions and found 40 positive cases. The patients were 1-68 year old, 55% were females and 45% were males, the abnormalities included 20 acoustic neuromas, 4 inflammatory lesions, 4 vascular lesions, 3 meningiomas, 2 trigeminal neuromas, 2 arachnoid cysts, 1 epidermoid cyst, 1 metastasis and 1 chordoma. Two patients with intra axial lesion that extended into the region of the CPA cistern were also included in the study (one brainstem glioma and one cerebellar astrocytoma). Another case of petrous bone rhabdomyosarcoma invading into the CPA cistern was also included in the study.

Table - 1: Types of lesions noted in CPA and IAC.

Lesion (Radiological diagnosis)	No. of lesions	Percentage overall (%)	Percentage among tumors (%) (n=33)
Acoustic neuroma	20	48.78	60.60
Trigeminal neuroma	2	4.87	6.06
Meningiomas	3	7.31	9.09
Metastasis	1	2.43	3.03
Exophytic intra axial tumors	2	4.87	6.06
Chordomas	1	2.43	3.03
Rhabdomyosarcomas	1	2.43	3.03
Epidermoids cyst	1	2.43	3.03
Arachnoid cyst	2	4.87	6.06
Inflammatory	4	9.75	--
Vascular	4	9.75	--
Total	41	--	--

Table – 2: Site and extent of lesions.

Lesion	CPA	IAC	CPA & IAC	Petrous bone	Middle cranial fossa	Cavernous sinus	Brain stem	Cerebellum
Acoustic neuroma (n=20)	--	2	18	--	--	--	--	--
Trigeminal neuroma(n=2)	2	--	--	--	1	--	--	--
Meningioma (n=3)	3	--	--	--	--	--	--	--
Metastasis (n=1)	--	--	1	1	1	1	--	--
Exophytic intraaxial tumors (n=2)	2	--	--	--	--	--	1	1
Chordomas(n=1)	1	--	--	1	1	1	--	--
Rhabdo-myosarcomas (n=1)	--	--	1	1	1	1	--	--
Epidermoids cyst (n=1)	1	--	--	--	--	--	--	--
Arachnoid cyst (n=2)	2	--	--	--	--	--	--	--
Inflammatory (n=4)	2	1	--	2	--	--	--	1
Vascular (n=4)	2	2	--	--	--	--	--	--
Total & percentage	15 (36.6%)	5 (12.2%)	20 (48.8%)	5 (12.2%)	4 (9.7%)	3 (7.3%)	1 (2.4%)	2 (4.9%)

Table – 3: Nature of all lesions.

Lesion	Number of lesions	Percentage
Neoplastic	30	73.17%
Congenital	3	7.3%
Inflammatory	4	9.75%
Vascular	4	9.75%
Total	41	--

Table – 4: Characteristics of tumors.

Lesion	Solid	Cystic	Hemorrhagic	Calcified or bony
Acoustic neuroma	17	3	1	--
Trigeminal neuroma	2	--	--	--
Meningioma	3	--	--	--
Metastasis	1	--	--	--
Exophytic extra axial tumors	1	1	--	--
Chordomas	1	--	--	1
Rhabdomyosarcomas	1	--	--	--
Epidermoids	--	1	--	--
Arachnoid cyst	--	2	--	--
Total and percentage	26 (78.78%)	7 (21.21%)	1 (3.03%)	1 (3.03%)

Table - 5: Vascular encasement, meningeal involvement and vascular encasement.

Lesion (Radiological diagnosis)	Cranial nerve involvement	Meningeal involvement	Vascular encasement
Acoustic neuroma	20	1	--
Trigeminal neuroma	2	--	--
Meningiomas	3	2	--
Metastasis	1	1	1
Exophytic intra axial tumors	2	--	--
Chordomas	1	1	1
Rhabdomyosarcomas	1	1	1
Epidermoids cyst	--	--	--
Arachnoid cyst	1	--	--
Inflammatory	4	3	--
Vascular	4	--	--
Total	39 (95.12%)	9 (21.95%)	3 (7.31%)

Radiological diagnosis was confirmed with histopathological diagnosis where ever surgery was done or with other laboratory reports in appropriate clinical setting. The detailed results are presented in tables. **Table - 1** shows the types of lesions noted in CPA and IAC. Site and extent of lesions are describes in **Table - 2**. The nature of all lesions was shown in **Table - 3**. Characteristics of tumors seen was shown in **Table - 4**. **Table - 5** shows the vascular encasement, meningeal involvement and vascular encasement in all the cases. Relative MR Signal intensities of CPA-IAC lesions (in comparison to signal of pons) is shown in **Table - 6**.

Discussion

CP angle and IAC lesions comprise a diverse group of lesions. Lesions of the internal auditory canal/ cerebellopontine angle (IAC/CPA) have been extensively described. Contrast enhanced MRI has made a major impact on the detection and diagnosis of acoustic schwannoma, meningioma, and epidermoid of the IAC/ CPA area. The most common lesion in the IAC is the schwannoma of cranial nerve VIII (also known as acoustic neuroma). They account for 8% to 10% of all intracranial tumors and 80% to 90% of all CPA tumors [3]. However, a large variety of unusual lesions can also be encountered in the CPA. The site of origin is the main factor in making a preoperative diagnosis for an unusual lesion of the CPA. CPA masses can primarily arise from the cerebellopontine cistern and other CPA structures (arachnoid cyst, non-acoustic schwannoma, aneurysm, melanoma, miscellaneous meningeal lesions) or from embryologic remnants (epidermoid cyst, dermoid cyst, and lipoma). Tumors can also invade the CPOA by extension from the petrous bone or skull base (Cholesterol granuloma, paraganglioma, chondromatous tumors, chordoma, endolymphatic sac tumor, pituitary adenoma, and apex petrositis). Finally, CPA lesions can be secondary to an exophytic brain stem or ventricular tumor (glioma, choroid plexus papilloma, lymphoma, hemangioblastoma, ependymoma, medulloblastoma, dysembroplastic neuroepithelial tumor [8].

Table - 6: Relative MR Signal intensities of CPA-IAC lesions (in comparison to signal of pons).

Lesion	T1W signal intensity (No of observations)						T2W signal intensity (No of observations)						T1W post contrast (No of observations)						DWI		FLAIR sequence			
	A	B	C	D	E	NS	A	B	C	D	E	NS	A	B	C	D	E	NS	A	B	A	B	C	NS
Acoustic neuroma	16	4		16	4		2	10	8	16	4			2	18	16	4		6	1		12	8	
Trigeminal neuroma	1	1		1	1				2	1	1				2	1	1						2	
Meningioma	1	2		3				1	2	3					3	3				3		1	2	
Metastasis	1			1				1		1				1		1						1		
Exophtic intraxial lesion	2			1	1				2	1	1			1			1	1					2	
Vascular	3		1	4			4			4					4	4					4			
Chordoma	1				1				1		1		1				1				1			
Inflammatory	1			1		3			2	2		2			4	3	1						3	1
Rhabdo-myosarcoma	1				1			1			1				1		1						1	
Epidermoid	1			1					1	1								1		1			1	
Arachnoid cyst	2			2					2	2								2	2				2	
Total	30	7	1	30	8	3	6	13	20	31	8	2	1	4	32	28	9	4	8	5	5	14	21	1

T1w: a=hypointense signal b= isointense signal c= hyperintense signal d= homogeneous e= heterogeneous, T2w : a=hypointense signal b= isointense signal c= hyperintense signal d= homogeneous e= heterogeneous, T1w post contrast: a= mild enhancement b= moderate enhancement c= marked enhancement d= homogeneous e= heterogeneous, Diffusion imaging (DWI) a=free diffusion b= restricted diffusion. FLAIR sequence: a=hypointense signal b= isointense signal c= hyperintense signal, NS= signal not seen.

Majority of lesions found in this study were tumors (33 lesions), next common in our series were inflammatory lesions and vascular lesions (4 each case). Among all lesions and tumors most common MR diagnosis in our study was acoustic neuroma 20 of 41 lesions (48.78%) and 20 of 33 tumors (60.60%) respectively. Next common among tumor was meningioma 3 out of 33 cases (9.09%).

Acoustic neuromas are most common among all CPA and IAC lesions and tumors, with next common being meningiomas. This fact has been well highlighted in previous literature [9]. The results of the present study are consistent with their findings except for vascular and inflammatory lesions which are next common lesions after acoustic neuromas in our study .This variation is due to more common occurrence of infective pathologies in our setup as majority of inflammatory lesions in our series were infective . The other reason for this variation could be due to much better anatomical detail of IAC and good pick up of lesions by high resolution FSE T2- weighted sequence and thin section T1-weigted sequences used after gadolinium administration. The results of the present study reveal that most common presentation of these cases was SNHL 24 cases (60%). Tinnitus was seen in 16 cases (40%), ataxia 10 cases (25%), headache in 9 cases (22.5%) and long tract signs were seen in 6 cases (15%). Multiple cranial nerve palsy and facial twitching / hemifacial spasm was seen in 5 cases each (12.5%). SNHL and tinnitus are the most common presenting features in acoustic neuroma and other unusual tumors of CPA as demonstrated by earlier studies [6]. Hydrocephalus was observed in 15 tumors (45.45%). Transtentorial and tonsillar herniation was observed in 8 and 4 cases respectively. Pirouzmand F, et al. have described that 3.7% to 15% of CP angle tumors can develop Hydrocephalus [10].

A total of 19 cases with 20 acoustic neuromas were diagnosed with MR. Bilateral acoustic neuromas was seen in 1 case. Unilateral lesions were seen in 18 cases and more were on right side. The age distribution ranged from 15-70 years (peak age 31-50 years), with majority seen in female population. 18 acoustic neuromas had extra and intracanalicular extension (90%). Two lesions were completely intracanalicular (10%). No lesion involved the extracanalicular portion of the 8^{th} nerve exclusively in our study. 19 lesions were newly diagnosed while one lesion was imaged after partial resection. All of the 20 lesions detected were seen on unenhanced MR images. One lesion was detected on CEMR images however this was excluded from acoustic neuroma group on subsequent follow up MRI after 6 months which was normal and the diagnosis of post-operative inflammatory change for this case was made. The smallest lesion detected in our study was tumor measuring 7x7 mm. This tumor was having component both in IAC & CPA cistern. The largest tumor detected was 65x35mm. The majority of acoustic neuromas were hypointense on T1 weighted images and isointense on FLAIR and T2 weighted images. 16 tumors were homogeneous in appearance on non-contrast and CEMR images. The heterogeneity was due to hemorrhage, necrosis, or cyst formation. 17 cases were solid, 3 cystic and one hemorrhagic. MR delineated cystic acoustic neuromas with great detail and in our study 3 cystic acoustic neuromas were diagnosed. Plain MR images demonstrated erosion of IAC in all 19 newly diagnosed lesions. Axial MR images were more useful than coronal images in demonstrating partial resection of posterior wall of the IAC in postoperative cases. Both the exclusively intracanalicular tumors caused obscuration of the 7^{th} & 8^{th} nerves and displacement of the CSF from the IAC. These findings were best seen on T2 weighted FSE images. Displacement and or compression of the brain stem structures were well delineated by the MR and noted in 12 tumors. Hydrocephalus is seen in 9 tumors, brain stem rotation in 9, tonsillar herniation in 4, Transtentorial herniation 8 and edema in adjacent brain in one tumor. These secondary effects were observed in tumors with extracanalicular extension of measured diameter greater than 1.5cm. MR demonstrated displaced blood vessels at periphery of 11 of 18 tumors with extracanalicular extension. Almost all cases have shown cranial nerve involvement with meningeal involvement in the form of dural tail in one case. No vascular involvement was observed. Majority of cases presented with sensineural hearing loss (SNHL), the next common symptom was tinnitus. Ct was done in 8 cases and was negative in 3 cases. MRI was positive in all lesions.

In the present study Acoustic neuromas were found in age group of 15-70 years with most cases at 30-50years. Similar results were observed by previously in many studies that showed tumors occurred most commonly between 30-70 years of age with peak at 40-60 years [11]. Overall, the acoustic neuromas among all CP angle lesions in present study were 48.78 % and among CP angle tumors in this study were 60.60%, which is same as reported previously in many studies [12]. Bilateral tumors were seen in one case (5.26%) and unilateral in 18 cases (94.73%), almost, same results were mentioned by Consensus development panel in 19191 (51% and 95% respectively).

The utility of CEMR imaging in the investigation of post-operative cases of acoustic neuroma have been reported. One of our cases shows residual intra-canalicular tumor with post-operative changes in cerebellum well delineated after administration of gadolinium, similar post-operative changes have been described earlier [13]. A repeat scan at 6 months showed no enhancement helping us in making diagnosis of post-operative inflammatory change. In literature dural enhancement has been identified as early as one month and as late as 40 years following craniotomy [14]. Sixteen of 18 lesions (88.98%) with extracanalicular acoustic tumor parts were centered at the porus acousticus in the present study. It was considered one of the important signs in differentiating acoustic neuromas from other tumors at CPA. Similar results have been reported in previous studies where tumors centered at porus acousticus were 85% to 96% [15, 16]. Most of the tumors were hypointense on T1 weighted and isointense on T2 weighted and FLAIR sequences. Heterogeneity was seen in most tumors and was due to hemorrhage, necrosis and cyst formation in our study. Press GA, et al. have shown the same results with almost all tumors hypointense on T1 weighted and majority isointense on T2 weighted pulse sequences [17]. Diffusion imaging was done in 7 large lesions; the diffusion was restricted only in one lesion while other six lesions have shown free diffusion. Free diffusion in these tumors was because of loose tumoral cells and increased extracellular water matrix, similar results were reported previously [18]. Hemorrhage was observed in one tumor (5%). Compression No abnormality detected. Rotation of brain stem resulted when extracanalicular mass measured more than 1.5 cm in transverse diameter. In present study brain stem compression was seen in 60% (12 tumors) while Brainstem compression as reported by previous studies is 45% [15]. The higher side of our percentage was because of initial neglect of physicians who used to treat initial presentation (SNHL) of acoustic neuromas as simple hearing loss and most cases were send for imaging only after development of more advanced neurological features . In our series vascular capsule was noted surrounding 11 of 18 extracanalicular components. The capsule appeared as a rim of low signal intensity on all pulse sequences similar to many previous studies, which have shown that 22 of 30 acoustic neuromas show such a capsule [19].

Three meningiomas were diagnosed in present study forming 7.31% among all lesion and 9.09% among tumors of CPA & IAC. Two were arising from posterior surface of petrous bone and one was arising from tentorium. The largest one was 63x67 mm and the smallest was 35x26 mm. All lesions were detected on non-contrast MRI. Many studies suggest that meningiomas arise from meningothelial arachnoid cells and contribute about 6-10% of the CP angle lesions [20]. They occur in adults between 30-60 years and are more common in females with a sex ratio of 2:1 [21]. This is consistent with findings of the present study. “Dural tail sign” though favors diagnosis of meningioma is a non-specific feature [22]. Non specificity of this was also observed in the present study as this sign was seen in two meningiomas and in one schwannoma.

Trigeminal neuroma are mainly observed in adults with female predilection commonly presenting with facial pain and paresthesias [23]. They occur at an age but predominate in the fourth and fifth decade [24]. These features were in concordance with our study as both of our trigeminal neuromas were found in females on right side in 4^{th} and 5^{th} decade (the peak at which our maximum acoustic neuromas occurred) and presented with loss of sensation / pain in face on ipsilateral side. Although increased signal intensity on T2 weighted images (prolonged T2) and decreased signal intensity on T1 weighted images (prolonged T1) may be non-specific, the exquisite morphologic specificity of MRI generally permits a highly educated guess about the diagnosis of trigeminal neuroma [25].

In the present study, four inflammatory (9.75%) lesions were seen. Among the inflammatory lesions 1 was chronic abscess. 1 post-operative inflammation, 1 infected pneumatised petrous bone, 1 viral neuritis. All the lesions were observed at 30-50 years of age. 2 lesions were in the IAC and 2 in CPA cistern. Meningeal involvement was seen in 2 lesions. The development of brain abscess from temporal bone inflammatory diseases are well recognized and occur along a variety of routes [2]. In the present study case of pyogenic abscess was observed in a case of chronic otitis media. The abscess revealed rim enhancement, adjacent edema and mass effect. Similar features have been reported earlier also [2]. Vascular lesions are rare and may mimic neoplasms in posterior fossa and the CPA cistern. Vascular lesions usually present as tinnitus and MRI is the investigation of choice [26]. In present study, these lesions were not rare and comprised the largest group after acoustic neuroma in CP angle and IAC lesions. The reason for this increased occurrence is possibly due to better pick up of high resolution FSE T2 weighted sequences and thin section post contrast T1 weighted images.

Chordomas of the CP angle and petrous apex arise from remnants of the cranial end of the notochord. These tumors commonly arise near the clivus and cause destruction of the petrous bone and petrous apex [27]. In the present study only one case of chordoma at MR imaging was seen, especially on T2 weighted images chordomas usually appear as lobulated, large, hyperintense masses with low septal signal intensity, almost similar features have been reported earlier also [28].

Two arachnoid cysts and one epidermoid was observed in our study. Both arachnoid cysts and epidermoid cysts were hypointense on T1 weighted images and hyperintense on T2 weighted images. No contrast enhancement was seen post gadolinium in any of these lesions. The bright signal of epidermoids is possibly due to the different intracystic components. The epidermoids have flaxy or waxy material within cyst produced due to desquamation of tumor wall and is composed chiefly of keratin and cholesterol crystals which is similar to the results of previous studies [29].

Exophytic intra axial tumors are of interest in that rarely a tumor that arises from brain parenchyma may protrude laterally to present with clinical and radiographic picture stimulating that of the much more common extraaxial lesion at this area [30]. Similar observations were made in the present study where case who initially had only SNHL and was treated on conservative lines, almost similar features are described earlier [31]. However casein the present study had contrast enhancement which could be due to progression to higher grade. Both of our cases have shown blurring of the margin between the tumor and brain stem or cerebellum and 1 case has shown peritumoral hyperintensity on T2W sans disproportionate to the size of extra axial mass however none had revealed the dilatation of the lateral recess of the fourth ventricle.

Only one lesion of metastasis (3.03%) of petrous bone involving IAC and CPA cistern was seen in a known case of breast cancer with another, similar lesion was observed in right side of occipital bone showing a similarly enhancing lesion with extra dural component. Armington, et al., have shown that 1% of CPA tumors are metastasis; our study shows more percentage possibly because of smaller number of cases in our series [32]. While Tali, et al., have shown that MR findings with clinical correlation are not only useful for the detection of CPA metastasis but also for their differentiation from more common benign tumors [33].

MRI shows CPA and IAC with such a clear anatomical detail that it is unlikely pathology can be missed in this area. MR imaging findings are very helpful in establishing the preoperative diagnosis for lesions of the CPA and IAC. MRI was in most cases able to actually delineate the origin and extent of lesions by its multiplanar capability. Majority of inflammatory lesions which once were just a guess diagnosis and used to be the causes of the most patients complaints are now well discovered by MRI.

Conclusion

The results of the present study concluded that, MRI has particular advantages over CT for study of internal auditory canal and cerebellopontine lesions because it is non ionizing investigation, better soft tissue contrast and resolution, multiplanar capability permits more reliable distinction of lesions, better identification of structures involved by lesions, tissue characterization of lesions and absence of beam hardening artifacts makes MR imaging superior ion evaluating the lesions in CP angle and IAC. The radiological features of various lesions are often sufficiently distinctive to permit a specific diagnosis to be made. MR imaging due to its multiplanar capability helps in knowing the exact site and extent of these lesions. MRI shows inflammatory and vascular lesions with exquisite detail and is better for detection of such lesions as compared to CT. MRI allows a confident perspective pathologic diagnosis to be made (Using FSE T2 weighted images, diffusion imaging , SE images , thin section post gadolinium scans) and this predictive value far exceeded the CT.

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