Original Research Article

Solitary choroid plexus lipoma evaluation by computed tomography with review of literature

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International Archives of Integrated Medicine, Vol. 3, Issue 5, May, 2016.

Available online at http://iaimjournal.com/

ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**

Received on: 02-05-2016 **Accepted on:** 09-05-2016

Source of support: Nil **Conflict of interest:** None declared.

How to cite this article: Balaganesan H, Ilangovan G, Tirumalasetty H, Jayajothi A, Venkataraman S. Solitary choroid plexus lipoma evaluation by computed tomography with review of literature. IAIM, 2016; 3(5): 127-132.

Abstract

Among the Intracranial lipomas which are reported to be rare, the choroid plexus lipomas are mostly associated with pericallosal lipomas which also presents isolated. The retrospective study for evaluation of solitary choroid plexus lipoma (SCPL) using Computed Tomography (CT) by altering CT window level settings showed increased negative predictive value and specificity. The solitary choroid plexus lipomas which on routine CT scan could be overlooked as the lipoma and the surrounding cerebrospinal fluid (CSF) appears hypodense in routine CT scan can be better identified by viewing with altered window settings. This can aid in better identification of the other intracranial lipomas.

Key words

CT scan, Solitary choroid plexus lipoma, Intra cranial lipomas.

Introduction

When the diagnosis was made based on autopsy reports the Intra-cranial lipomas (ICL) were relatively rare whereas after the medical imaging advancements with computed tomography and magnetic resonance imaging (MRI) the diagnosis of ICL are not that rare. Lipoma within the choroid plexus is not that rare either, but it tends

to be associated with other intracranial lipomas mostly making isolated occurrence to be not that common. Mostly solitary choroid plexus lipomas are asymptomatic. Recent literature suggests that these solitary choroid plexus lipomas are not as rare as we thought it to be [1, 2].

Aim

- To evaluate the prevalence of solitary choroid plexus lipomas by altering CT window settings and to review with literature.

Objective

The aim could be achieved by paying special attention to the choroid plexus, which in a soft tissue window can mimic CSF density in the patient population for whom CT Brain scans were performed and by altering the window settings so that the difference between the fat and CSF density could be appreciated making identification of choroid plexus lipoma evident and thereby avoiding the pitfall.

Materials and methods

A retrospective observational study by evaluation of 500 CT brain studies performed using Seimens Dual slice Somatom Spirit CT scanner was considered for the study. As the human eyes cannot effectively differentiate the entire spectrum of shades of grey shown by the CT, we selected a clinically needed grey scale setting by specifying CT window level (WL) and window width (WW). CT window level (WL) represents the mean HU of all the numbers within the window width (WW). The WW covers the Hounsfield units of all the tissues of interest, in our study to include the fatty tissue which has a negative HU and these are displayed as various shade of grey. Tissues with HU outside this range are displayed as either hypodense (black) or hyperdense (white). Reviewing images of all the patients for whom CT Brain was performed with the CT windowing parameters of WL = -10 to 10 and WW = 50 to 70 which helps to better distinguish the lipoma fat density from the adjacent surrounding CSF density with a magnified view of lateral ventricles. Identified cases of solitary choroid plexus lipomas were confirmed by measuring the Hounsfield units (HU). Experienced radiologists with more than 3 years experience were involved in reviewing the images. Statistical analysis of the data was performed and any relation to the age, sex and clinical data was evaluated. (**Figure – 1, Figure – 2a, 2b**) All patients irrespective of age, sex or their clinical data were included in the study and patients with pericallosal lipoma and bilateral choroid plexus lipomas were excluded.

Figure - 1: CT Brain in soft tissue window setting appears relatively normal with good differentiation of grey matter and white matter while the visualized lateral ventricle appears hypodense (black).

Figure - 2a: CT Brain with altered window settings (CT windowing parameters of WL = -10 and WW = 63) the small choroid plexus lipoma on the right lateral ventricular trigone appears hypodense (Black) in comparison to the lateral ventricle CSF which appears hyperdense (Brighter shade of grey) which was not appreciated in the routine window setting.

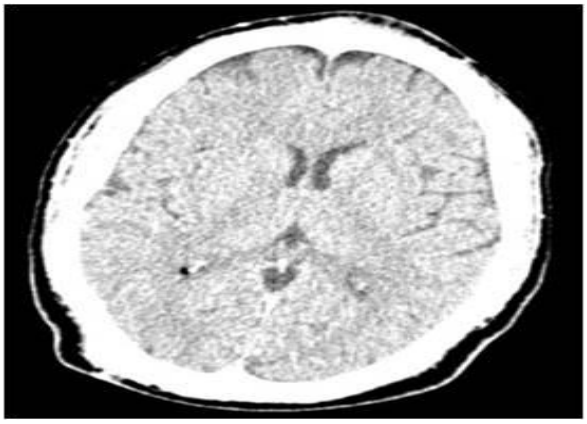
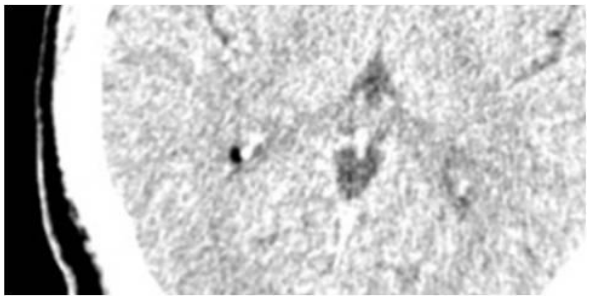


Figure - 2b: Magnified image focusing the Choroid plexus lipoma.



Results

Out of 500 CT brains evaluated 8 cases of intracranial lipomas were identified out of which 4 inter hemispheric falcine lipoma, 2 solitary choroid plexus lipoma, 1 superior cerebellar cistern lipoma and 1 quadrigeminal cistern lipoma. These were identified with the CT windowing parameters of WL =-10to 10 and WW = 50 to 70 which helps to better distinguish the lipoma fat density from the adjacent surrounding CSF density. The Hounsfield Unit of the lesions were within -43 to -64 for the intracranial lipomas and the solitary choroid plexus lipomas it was -43 and -54. The two patients with solitary choroid plexus lipoma were 27 year old male and 49 year old female with the location being on the trigone of the right and left lateral ventricles measuring 3.7 mm and 3.9 mm respectively. One patient had CT Brain done after a road traffic accident and other for nonspecific headache. The sensitivity at 95% Confidence interval was 15.81% to 100% and the specificity at 95% Confidence interval was 99.26% to 100% for the study. The prevalence ranged between 0.05% to 1.44%. The negative predictive value of identifying solitary choroid plexus lipoma in CT Brain with the window setting sufficient to distinguish CSF and lipoma was 99.26% to 100%.The study revealed that these lipomas were overlooked in the initial reports and when the sufficient window settings were used it was effectively identified.

Discussion

Intracranial lipomas even though it was considered to be rare accounting for 0.35% of all intracranial tumours diagnosed by computed tomography [1, 2]. They are relatively common lesions among the developmental anomalies of the brain [3]. The patients are usually asymptomatic but can present with nonspecific headaches, seizures, vertigo, intellectual disturbances and hemiplegia.

Yidiz, et al. after their retrospective study of intracranial lipomas reported that these intracranial lipomas are mostly pericallosal midline lesions which are asymptomatic while the other locations are quadrigeminal cisterns, inter peduncular cistern, sylvian fissure, inter hemispheric fissure, choroid plexus, inter cerebellar fissure and corpus fornicis [4]. All the patients with lipomas within the sylvian fissure had presented with seizures [4] and no specific clinical correlation with the SCPL.

These Intracranial lipomas are congenital malformation resulting from the metaplasia of primitive meninges during development. The choroid plexus lipomas like meningiomas are related to meningeal tissue and hence its characteristic location within the ventricles is believed to be in the trigone similar to the intra ventricular meningiomas which arise only at the trigone [1-4, 12].

In one of the earliest literature review about solitary choroid plexus lipoma, Krainer in the year 1935 listed 8 cases of isolated choroid plexus lipoma and 3 cases of choroid plexus lipoma associated with corpus callosal lipomas [5]. Ehni and Adson quoteda case reported by Simon which was cited by Scherer in 1935 [6]. Another case was reported by Liber and Lisain 1940 [7].

Barber reported a 36 year female who had acute mania for whom on autopsy examination of brain showed small ovoid nodule in the left lateral ventricle choroid plexus which microscopically consisted of mature adipose tissue and hence considered lipoma. He believed that he had reported the 11th case. He also considered that many cases might not have been reported [7].

Uchino et al detected 23 intracranial lipoma with 9 pericallosal lipomas, five in quadrigeminal cistern, three at superior cerebellar cistern, three choroid plexus lipomas, two in inter pedunclar cistern, and one in ambient cistern. The three solitary choroid plexus lipomas which he had reported were in 62 year old male, 26 year old male, 56 year old female who had presented with transient right hemiparesis, vertigo and visual disturbances [2]. The lesions ranged in sizes between 3 to 7 mm. On computed tomography two of the masses appeared as fat density lesions within the choroid plexus of lateral ventricles but one case was not identified even retrospectively. In MRI, the lesions appeared hyperintent in T1weighted images, hyperintent in Proton Density images, mildly hypoinent in T2 weighted images with chemical shift artifacts, completely suppressed in fat saturated images and hyperintent in water saturation images. Uchino, et al. suggested that these minute lipomas may be overlooked in CT because both the CSF and lipoma appears hypodense to brain parenchyma. MRI especially T1WI is more useful in identification of intracranial lipomas as lipomas appears hyperintent in comparison to the surrounding hypointent CSF.

Sener reported seven patients of isolated choroid plexus lipomas at the trigone without coexistent pericallosal lipomas or other intracranial lipomas, of five adults (30 to 59 years) and two children (7 and 1 year old). Of the seven patients four were female and 3 male whom presented with non-specific headaches (6 patients) and rhombencephalosynapsis (1 patient) [3].

Yildiz, et al. study for localizing ICL, reported24 patients with ICL out of which two were solitary choroid plexus lipomas. Their study revealed that sylvian fissure lipoma patients were associated with seizures [4]. Ganguly, et al. reported a 32 year old female with solitary choroid plexus lipoma in the left lateral ventricle trigone which had classical appearance in CT and MR imaging [8]. Amanullah Khan, et al. reported a 51 year old female who presented with headache had a 7 mm homogenous fat attenuation in the left choroid plexus in CT scan which on MRI showed hyperintent signal in T1WI and FLAIR, low signal in T2WI, complete suppression by the chemical shift selective images [9, 10]. Fiori, et al. reported a case of solitary lipoma of choroid plexus on the left side in an adult female baboon in 1994 which histologically was composed of characteristic adipose cells with scarce collagen septa and without glial cells, neurons, and cartilage or muscle fibres [11]. Obersteiner reported a case of medial choroid plexus lipoma in a duck which was quoted by Krainer [5].

The initial reports of SCPL were from autopsy reports and only after the development of imaging modalities SCPLs were reported from the characteristic appearances on CT and MRI summarized in the **Table - 1**. Among the 15 patients presented with SCPL whose sexes were published out of 27 patients, 9 were female patients and 6 were male patients. Among the 9 patients for whom the side of lesion revealed 6 were on the left side and 3 on the right side. The patients age ranged between 1 to 62 with mean age of 36 and they presented with asymptomatic or non specific headaches in 8, 1 transient hemiparesis, 1 vertigo, 1 visual disturbance. The size of the solitary choroid plexus lipoma is between 2 to 10mm. Intracranial Lipomas on CT appears as well defined homogenous hypodense structure whose density corresponds to that of the adipose tissue attenuation [12]. On MRI these lipomas show increased signal in T1WI, FLAIR and low signal in T2WI corresponding to the adipose tissue signal with short T1 and T2 relaxation times. Uchino et al concluded that small choroid plexus lipomas may be overlooked on CT scan and on MR images, if they are located in intersection gaps. Our study also seconds the view of these small lipoma can be overlooked and by reviewing with altered window settings the detection could be increased.

Conclusion

Solitary choroid plexus lipomas are relatively rare which could be overlooked in routine CT scans. Altering the CT window settings for

evaluation has increased specificity in the detection of these lipomas and increased negative predictive value. We believe that similar to the study by Yildiz, et al. which showed that sylvian fissure lipomas were identified in association with epilepsy, future studies with large sample can identify correlation of these nonspecific lipomas with clinical condition.

Table - 1: Data of Solitary Choroid plexus Lipoma reported in Literature.
T1 Weighted images (T1WI), T2 Weighted images (T2WI), Proton Density Imaging (PDI), Fluid attenuation inversion recovery (FLAIR), Fat suppression imaging (FSI), Water saturation images (WSI), Chemical Shift Selective imaging (CHESS), Male (M), Female (F), Right (Rt), Left (Lt), Hyper intent signal (Hyper), Reduced or hypointent signal (Hypo).

Author	Year	Isolated CPL	CT	MRI	Age	Sex	Side	Size (cm)	Symptom
Krainer	1935	8							
Ehni and Adson (case of Simon)	1935	1							
Liber and Lisa	1940	1							
Barber	1950	1			36	F	Lt	0.5	
Uchino	1993	3	Fat density attenuation	T1WI – Hyper, PDI - Hyper, T2WI - Mildly Hypo with chemical shift artifacts, FSI – Hypo, WSI -Hyper	62, 26, 56	M-2 F-1	Rt-1 Lt-1	0.3 to 0.7	Transient hemiparesis, vertigo, visual disturbances
Nuri Sener	1995	7	Fat density attenuation	T1WI - Hyper, T2WI- Hypo, FSI – Hypo, WSI - Hyper	Adult – 5 (30 to 59) Children – 7, 1	M-3 F-4	Lt-1 Rt-1	0.2 to 0.4, 10	Nonspecific headaches, rhombencephlosynapsis
Yildiz	2006	2							
Romita Ganguly	2007	1	Homogenous fat attenuation	T1WI – Hyper, FLAIR - Hyper	32	F	Lt	0.3 x 0.2	headache
Amanullah Khan	2011	1	Homogenous fat attenuation	T1WI – Hyper, FLAIR - Hyper, T2WI- Hypo, CHESS - Hypo	51	F	Lt	0.7 x 0.6	headache

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