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Abstract

Abstracts -Background -Intracranial calcifications are veritable radiological pointer to pathologies.Therefore there is need to differentiate physiological and pathological calcifications. Objective -Todetemine the incidence of physiological intracranial calcifications and relationship to age and sex. Materials And Methods -A cross sectional descriptive study of the computed tomograms (CT) of the brain was done from 8/4/09 to 18/10/2009 using a Schumadzu CT scan machine with continuous rotationalsystem. Data was analysed using SSPS3. Results -132 patients were studied with 75 males and 57 females. Age range is 0-89. The highest studied population is in the 40-49 years with 38(28.78

Index terms— Intracranial calcification, Computed tomography, Pineal, Choroid.

1 INTRODUCTION

ineal gland is a neuronal structure that lies within the CSF of quadrgeminal cistern but posterior to the cistern of velum interpositum [1].

It is attached to the upper aspect of posterior border of 3 rd ventricle [1]. Embryologically, it is a pine-cone shaped ependymal evagination from the roof of caudal portion of the 3 rd ventricle at 7 th week intrauterine life [1]. Radiographically, C-shaped habenular calcification is 4-6mm anterior to pineal gland [1,2].This is seen in 15% of adult population [2]. 95% of pineal gland is made up of pinealocytes with dendritic processes while neuroglial supporting cells make up the rest of 5% [1].

Choroid plexus of lateral ventricle on the other hand, is an intra-ventricular vascular structure involved in the production of cerebrospinal fluid (CSF). It extends from the inferior horn of lateral ventricle through the body to the interventricular foramen where it communicates with that of 3 rd ventricle. Radiogrphically,it is 20-30mm behind and slightly below pineal on lateral projection and symmetrical on AP projection [1] Intracranial calcifications are often an accidental findings on conventional radiographs or computed tomography (CT) scans [3]. Such calcifications can be physiologic or pathologic, the latter is accompanied by various diseases of the central nervous system. [3]. Intracranial physiological calcifications are unaccompanied by any evidence of disease and have no demonstrable pathological cause. Also,they are almost never clinically significant and often do not lead to any clinical concern [4,5,6]. The physiologic calcifications are very common and have been well-described in the past decades [7]. They are associated with aging and are common in certain locations like basal ganglia, pineal gland, falx, tentorium, arachnoid granulations, choroid plexus, cerebellum, distal ICA especially in the cavernous sinus, intradural vertebral arteries, and basilar artery [2,3,4,8,9,10] Physiological intracranial calcification is asymptomatic and is detected incidentally by neuroimaging [11,12]. CT is superior to MR imaging in the detection of calcification. [13] Computed tomography (CT) is the modality of choice with high sensitivity for detection and localization of intracranial calcifications [3,6,14]. .Intracranial calcification is visualized 9 to 15 times more frequently with computed tomography (CT) than with plain skull radiography [15]. A number of factors including slice thickness, window width and level may affect the detectability of calcification on CT [13].

The intracranial calcifications may have no clinical importance but they may be critical findings in diagnosing underlying pathology. [4,8]. Moreover, these statistics may be of interest from the clinical perspective and potential clinical use [6]. Also, these statistics can be used for comparing physiological and pathological intracranial calcifications. It is noteworthy that several pathologic conditions involving the brain are associated with calcifications and the recognition of their appearance and distribution helps narrow the differential diagnosis [4]. Knowledge of physiologic calcifications in the brain parenchyma is essential to avoid misinterpretations [6].

AIM OBJECTIVE: To determine the incidence of normal calcification of pineal gland and choroids plexus on Brain CT (computed Tomography) with correlation to age and sex.

2 II. MATERIALS AND METHODS

A cross-sectional descriptive study was conducted at Radiology Department of Polyclinic, Bonanjo, Douala, Cameroon, a tertiary hospital.

cranio -cerebral CT done from 8/4/09 to 18/10/2009. Schumadzu CT scan machine with continuous rotational system was employed. Axial sections of 2mm and 5mm slice tissue thicknesses were used from the base of the skull to the sella turcica, thence to the vertex respectively. IV Iopamidol at 1ml/kg was given when indicated. Images were reconstructed to achieve sagital and coronal images. Hounsfield unit and bone window were employed in some cases of doubt so as to differentiate calcifications from acute haemorrhage. The pineal gland and choroid plexus were evaluated for calcifications. A pair of choroid plexus calcifications in the atria of lateral ventricle was regarded as a single calcifications and calcifications in the 3 rd ventricle, 4 th ventricle and body of lateral ventricles were considered separately.

Patients' consents and ethical committee's approval were obtained. All patients with any pathology linked or associated with pineal gland or choroid plexus and those with improper data documentation were excluded. Results were analysed using SSPS 3.0.

3 III.

4 RESULTS

132 patients were studied with 75 males and 57 females. Age range is 0-89 with mean age of 44.5. The highest studied population is in the 40-49 years with 38(28.78%) patients. This is followed by 22 (16.66%) patients in the 50-59 age range. 116(87.88%) out of 132 patients studied had either pineal gland and/or choroid plexus calcifications. These 116 had a total of 136 seperate calcifications with 55.15% of choroid plexus calcifications and 44.85% of pineal gland calcifications. No calcifications was seen in patients less than 9years of age. The number of patients with choroid plexus calcifications (75) exceeds the number of patients with pineal gland calcifications (61). This corresponds to incidence of 56.8% for choroid plexus calcifications and 46.2% for pineal gland calcifications in terms of total studied population. This also correspond to choroid plexus calcification to pineal gland calcifications ratio of 1.23:1. 61 (46.21%of total studied population and 52.59% of patients with calcifications) patients had coexistent choroid plexus and pineal gland calcifications with 36(59.02%) males and 25(40.98%) females. 100% of choroid plexus calcifications were bilateral and symmetrical. 100% of choroid plexus calcifications were seen in the atria. 100% of all pineal gland calcifications were well defined. 15.79% of studied population less than 20years had physiological pineal gland calcifications.

In males, choroid calcifications were 43 (57.33%) patients and in females 32 (42.66%) patients. In pineal gland calcifications, males were 36 (59.02%) and females were 25 (40.98%).Both calcifications are more common in males than females. In choroid plexus calcifications, the incidence of calcifications in males is greater than females by 14.67% whereas in pineal gland calcifications, male incidence is greater than female incidence by 18.04%. Females less than 50years have lesser degree of choroid plexus calcifications than those greater than 50years. Where as male less than 50 years have greater degree of choroid plexus calcifications than those greater than 50years. Choroid plexus calcification increase with age in females but variable with age in males. Pineal gland calcifications is variable but seems to be more in those less than 50 years in males. Pineal gland calcification appears more common at a younger age in males but 50% of all males older than 60years have pineal gland calcifications. But females have greater incidence of pineal gland calcifications after 60years. In females, despite small variations, pineal calcifications increases with age. 47 patients of studied population are less than 40years. 34.04% of this 47 patients had pineal calcifications, constituting 12.12% of total studied population. 40.43% of this 47 had choroid plexus calcifications, constituting 14.39% of total population.

5 IV.

6 DISCUSSION

Before the advent of sectioning imaging, conventional radiography has been used to study intracranial calcifications. This led to the utility of pineal gland calcification as an insight into intracranial pathology. Pineal gland calcification greater than 3mm from mid-line in skull radiographs is used as a sign of intracranial mass or raised intracranial pressure [1] . But calcifications are only visualised on plain radiographs if the CT attenuation values are more than 200 Hounsfield units [16] In this modern age, imaging is gaining priority over clinical examination and neuroimaging has help clinician in narrowing down diagnosis. [6,17]. One important neuro-imaging tool with added advantage of calcification and ossification detection is computed was based on This tomography (CT). The identification of Intracranial calcifications on CT are the most common finding in daily neuro-radioloical practice since non-contrastenhanced CT of the head is the preferred imaging modality worldwide for the initial evaluation of patients with acute or chronic neurological problems [4,18]. In addition, CT confers precision to the localizations of brain tissue calcification This intracranial calcifications are often due to calcium

and sometimes iron deposition in the blood vessels of different structures of the brain. [6]. The pathogenesis of pineal gland and choroid plexus calcifications has also been said to be due to calcified concretions of calcium and magnesium salts in the specific tissue, seen more often in old people [19]. Physiological intracranial calcifications resulting from local tissue dystrophy are usually incidental. [20]. Intracranial calcifications can be classified mainly into 6 aetiopathogenetic groups namely: age-related and physiologic, congenital, infectious, endocrine /metabolic, vascular, and neoplastic [2] Intracranial calcification is occasionally an idiopathic feature and therefore detailed biochemical and hormonal evaluation is not carried out unless there is a high index of suspicion. [17]. Physiological intracranial calcification is asymptomatic and detected incidentally by neuroimaging. [11] Several pathologic conditions involving the pineal gland and choroid plexus are associated with calcifications and the recognition of their appearance and distribution helps narrow the differential diagnosis. [8]. This study is only interested in the age-related and physiological subset.

In this study, 116 (87.88%) out of 132 patients studied had either pineal gland and/or choroid plexus calcifications.. This is in agreement with the commonplace of physiological intracranial calcifications [8].

55.15% of these calcifications were choroid plexus calcification while 44.85% were pineal gland calcifications, The total number of physiological intracranial calcifications detected outnumbered the studied population because of co-existent pineal and choroid plexus calcifications in some patients. Such coexistence was common with advancing age. Choroid plexus calcification is known to be associated with pineal gland calcification [21].

46.21% of the total studied populations had pineal gland calcifications while 56.82% had choroid calcifications. Pineal gland calcification is visible on plain skull film in 33-76% in adults, but seen more frequently on CT [7]. The above incidence of pineal gland calcifications in this study is less than 2/3 rd of the population noted in other studies [1,22]. This choroidal calcification predominance has been reported by some authors [17]. However a reversal of this pattern was noted by other studies [3,23]. [22]Admassie and Mekonne reported an overall incidence of normal pineal gland calcifications of 72.0% and that of choroid plexus 43.3%. Similarly, Daghighi et al observed 71% of their 1569 studied population had pineal gland calcifications while 66.2% had choroid plexus calcifications [6].

It is pertinent that no choroid plexusn or pineal gland physiological calcification was seen in any patient below 9years of age. Choroid plexus calcifications in patients less than 9 years is uncommon and pineal gland calcifications under 9years of age may be suggestive of a neoplasm [23]. The rarity of pineal gland calcification in kids has even been brought down to less than 6years and its presence in these kids less than 6years suggest neoplasm [7].

[21]Doyle and Anderson however observed 1% of pineal calcifications in those less than 6 years [13]. [2]. Other studies found in their study that only 2% of children between 0 to 8 years of age have calcifications of the choroids plexus [1,4] and no pineal calcification was seen in <5years of age [1]. Physiological calcification of the choroid plexus on CT has been reported as early as 3years of age but it is uncommon in subjects less than 10years old [1,4] .However, Physiologic pineal calcification is more common in children than previously reported, mostly because of improving computed tomography technology. [21] In this study pineal gland calcifications were well defined, majority were solitary, < 4mm and few had conglome rate of 2 or 3 small calcifications. The size of pineal calcification is usually 3-5 mm, if greater than 1 cm, raise concerns for underlying tumor, like pinealoma, teratoma, AV malformation [1,7]. Pineal gland calcification of >3mm was never seen in less than age 5 [1,20] Pineal gland calcification can be solitary, compact, or amorphous ring-like calcifications or usually in the form of a cluster of amorphous, irregular densities [1,7].15.79 % of this studied population who were less than 20years of age had physiological pineal gland intracranial calcifications. Whereas other studies recorded a higher value of 40% of patients who are 20 years and below having physiological pineal calcifications [1,4]. But 30% of our studied population below 30 years had pineal physiological calcifications. . The physiologic calcifications of the choroid plexus are very common after the age of 40 years as noted in this study]4]., The pattern of pineal calcification across ages in this study is that females showed more calcifications in older age group of 70 years and above whereas males had more calcifications below 69years . The plausible explanation is the complete removal of the effect of the female sex hormonal control. The incidence of pineal gland and choroid plexus calcifications show male bias in this study as in other studies. In pineal gland calcifications, male incidence is greater than female incidence by 18.04% whereas in choroid plexus calcifications, the incidence of calcifications in males is greater than females by 14.67%. The incidence of normal pineal gland and choroids plexus calcification were higher in males than in females by 13.1% and 6.0% respectively [22]. The frequency of pineal gland and choroid plexus calcifications show a steady increase in both sex groups [22]. In general, the frequency of intracranial physiological calcifications was greater in men than in women as equally seen in this study with male to female ratio of 1.44:1 and 1.34:1 for pineal gland and choroid plexus calcifications respectively [6].

Choroid plexi calcifications are known to occur in all ventricles, most commonly in the glomus within the atrium of lateral ventricles near foramen of Monro] [1]. In this study, all chorid plexus calcifications were in the atria of lateral ventricles. In fact, Choroid plexus may calcify in all ventricles, most commonly in glomus within atrium of lateral ventricles, near foramen of Monro, tela choroidal of 3 rd ventricle, roof of 4 th ventricle, along foramen of Luschaka [1,2] Calcification in the third or fourth ventricle or in patients less than 9 years of age is uncommon. [2].

Young patients with exuberant calcification in the region of the glomerula, or with calcification extending into the bodies of the lateral ventricles should be evaluated for conditions associated with pathological calcification

of the choroid plexus. This also applies to patients of any age in whom calcification of the choroid plexus in the roof of the third ventricle or in the region of the foramen of Monro can be visualized with routine CT centre and window levels [5][F11]. Calcification involving the temporal horns is associated with neurofibromatosis [15] The pattern of choroid plexi calcification in this study were bilateral and symmetrical in 100% of positive cases of intracranial choroidal calcifications. While small calcifications of the choroid plexus are frequent, a large, single intra-cerebral calcification originating from the choroid plexus is rare [20]. Such bilaterallity and symmetry in the atria of lateral ventricles have been reported [1]. These calcifications are usually symmetrical but need not be always [1] Choroid plexus and pineal gland calcifications increased with age with maximum of 80% in 80-89 years in this entire studied population.. Females in this study had a peak of both choroid and pineal gland calcifications with 100% at 80-89 age range while males had earlier peaks of both calcifications which were before 4 th decade.

It is noteworthy that from 50years and above females tend to surpass males in the incidence of intracranial pineal gland and choroid plexus calcifications. Females were seen to have increasing pineal gland calcifications with age than males P hysiologic calcification of the choroid plexus increases in frequency and extent with age [15] but in this study , the conformity is more with females but variable in males. . The physiologic calcifications of the choroid plexus are very common after the age of 40 years [1]. In this study, half of male population after 50 years have physiological pineal gland calcification. All types of calcification increased at older ages except for lens and other non-defined calcifications [6]. The frequency of pineal gland and choroids plexus calcification showed a steady increase with age on both sex groups [22]. 100% of females in the age range 80-89 in this study had pineal and choroid plexus calcifications whereas only 50% of males demonstrated same. Calcifications of the choroid plexus are seen with increasing incidence from 0.5% in the first decade to 80% in the eight decade, with the largest jump from 35% to 75% during the 5 th -6 th decade [23].This conforms to the fact that choroidal plexus and pineal gland physiological calcification increases with age [17].

V.

7 CONCLUSION

Figure 1:

1 2 3 4 5 6

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[2]Incidence of physiological pineal gland and choroid plexus calcifications in cranio-cerebral computed tomograms in douala, Cameroon.© 2011 Global Journals Inc. (US)

[3]© 2011 Global Journals Inc. (US)

[4]May 2011 9 © 2011 Global Journals Inc. (US)Incidence of physiological pineal gland and choroid plexus calcifications in cranio-cerebral computed tomograms in douala, Cameroon

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PINEAL CALCIFICATIONS
STUDIED POPULATION

	MALES	FEMALES	TOTAL
0-9	8	2	10
10-19	5	4	9
20-29	8	3	11
30-39	4	13	17
Knowledge 40-49 calcifications is essential to avoid misinterpretations. of physiologic	24	14	38 intracranial 5
70-79	4	8	12
80-89	2	3	5
90-99	0	0	0
TOTAL	75	57	132

100
80
60
40
20
%PINEAL GLAND CALCIFICATIONS 0

MALES
FEMALES
MALES

Figure 2:

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