

## Intra Cranial Space Occupying Lesions In Saudi Patients Using Computed Tomography

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### Abstract

Intracranial Space occupying lesions (ICSOL) of the brain are usually due to malignancy but it can be caused by other pathology such as an abscess or a haematoma. This study was designed with an aim to study the incidence of ICSOL in Saudi patients at Al-Kharj province by using computed tomography modality. This retrospective cohort study was performed in the period of May 2011 to December 2012. A total of hundred consecutive patients referred to the Radiology Department of King Khalid Hospital at Al-Kharj province were recruited. Data collected included age, gender, ethnicity, underlying medical conditions, symptoms, signs and radiological imaging including chest radiographs and CT Brain. Out of examined samples, male to female ratio of 1.7:1; mean age  $\pm$  SD of  $29 \pm 1.7$  years. Neoplastic lesion; meningiomas were diagnosed in 22 males and 16 females, while non-neoplastic lesion; tuberculoma was diagnosed in 11 males and 6 females. Despite the different factors that may limit the validity of this study, this study has highlighted the relative frequency of different ICSOL at Al-Kharj province.

**Key Words:** Intracranial Space occupying lesions (ICSOL), Meningiomas, Neoplastic lesion, Tuberculoma.

### INTRODUCTION

CT imaging techniques are used routinely for evaluating brain tumors. These diagnostic tools provide important morphologic information regarding location, size, and mass effect of brain tumors. With the administration of contrast agents, these imaging techniques can more accurately demarcate the boundaries of neoplastic tissue from surrounding normal tissue.<sup>[1]</sup>

The term "Intra-cranial space occupying lesion" is defined as any neoplasm, benign or malignant, primary or secondary, as well as any inflammatory or parasitic mass lying within the cranial cavity.<sup>[2]</sup> The list also includes haematomas, different types of cysts, and vascular malformations.<sup>[2-7]</sup>

Among the intracranial space occupying tumours, those of central neurogenic origin claim priority in number and complexity. These are the tumours derived from parenchymatous neuroepithelial elements of central nervous system excluding the microglia; and they are widely credited to account for 40-50% of all the intra-cranial space occupying tumours.<sup>[8,9]</sup>

No accurate statistics reporting the incidence of ICSOL at Al-Kharj province. Therefore, it was decided to study the incidence of ICSOL in Saudi patients at Al-Kharj province by using computed tomography modality

### MATERIALS AND METHODS

This retrospective cohort study was performed in the period of May 2011 to December 2012. A total of hundred

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consecutive patients referred to the Radiology Department of King Khalid Hospital at Al-Kharj province were recruited. After the nature of the exam was fully explained, informed consent was obtained from both the consecutively enrolled outpatient and the Radiology Department. Prior to samples scanning, a formal approval was obtained from Ethics and Scientific Committee of King Khalid Hospital.

Sample characteristics; including socio-demographic data, clinical history and physical examination findings were recorded. Patients who had no clinical evidence of brain complain were not included in this study. Data collected included age, gender, ethnicity, underlying medical conditions, symptoms, signs, radiological imaging including chest radiographs and CT Brain.

Each patient had at least one cranial tomographic scan and was found having a space occupying lesion in the cranium. The gross examination of the biopsy specimens was performed. Contrast media was used to highlight the brain vasculature; each patient had at least one cranial CT scan. The diagnosis of ICSOL was based on the typical appearance on CT of brain with clinical features consistent with the diagnosis.

CT scanner used was Siemens Somatom Emotion 16 slice CT machine. Scanner features include 70 cm aperture, 50 cm scan field and a patient table that can hold patients up to 440 pounds. Also the scanner offers an image reconstruction on the fly with up to 16 images per second. During scanning the patient wear comfortable, loose fitting clothing. Routine scans start with scout view; Antero-posterior with 90 degrees central ray by using 135 kVp; 300 mA and 1.0 Sec with window width/window level of 80/30 for soft tissue.

Data were initially summarized into means, standard deviations (SD); mean  $\pm$  SD and percentages in a form of comparison tables and graphs. Statistical analysis was performed

using Microsoft Excel Software and the Standard Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 15 for windows.

**RESULTS**

The sample population comprised hundred consecutive patients. Their ages ranged between 15 to 65 years, with mean age±SD of (29±1.7) years. Males represent 64 (64%) of the study population, while 36 (36%) were females, with male to female ratio of (1.7:1) (Table 1). The peak age was in 26-36 years which accounted (34; 34%) cases (Table 2).

**Table 1: Frequency and percentage of genders**

Gender	Frequency	Percentage (%)
Males	64	(64%)
Females	36	(36%)
Total	100	(100%)

**Table 2: Distribution of patients' age**

Age ranges (Years)	Percentage (%)	Age ranges (Mean±SD)
15 – 25	(11%)	23±1.4
26 – 36	(34%)	35±3.1
37 – 47	(16%)	45±2.7
48 – 58	(14%)	56±2.3
59 – 69	(19%)	67±2.4
73-83	(6%)	78±1.4
Total	(100%)	35±3.1

During clinical examination, headache, vomiting, nausea and weakness were the most common findings, reported in (68%) of patients. Generalized convulsions were present in (11%) of patients, while behavioural change, ataxia and deficits of speech or vision were noticed in (9%) of patients only (Table 3).

Distribution of 100 cases of ICSOL was shown in (Table 4). Out of hundred Saudi patients, the incidence of different ICSOL detected by CT exam in the study was summarized in (Table 5). Neoplastic lesion; meningiomas were diagnosed in 22 males and 16 females, while non-neoplastic lesion; tuberculoma was diagnosed in 11 males and 6 females (Table 5).

**DISCUSSION**

The analysis shows that these hundred cases of ICSOL share several features common with other published series. Both age and sex distribution lie within the estimated ranges in the other reports. In this study, brain tumours occurred mostly during the third and sixth decades of life. In comparison to that most series reported from Asian countries, brain tumours occurred mostly during fourth decade of life, in Western countries during the fifth and sixth decades of life.<sup>[10-12]</sup> This could be due to the different age characteristics of the populations as well as different case ascertainment in the two country groups, with a higher rate of autopsies in the latter.

**Table 3: Distribution of clinical features**

Clinical features	Percentage (%) out of 100 samples
Headache	43%
Nausea/Vomiting	21%
Weakness	4%
Generalized convulsions	11%
behavioural change	6%
Ataxia	3%
Deficits of speech or vision	1%

**Table 4: Distribution of ICSOL in the study samples**

Lesion type	Males	Females	Total
Neoplastic Lesions	56	22	78
Non-neoplastic Lesions	8	14	22
Total	64	36	100

**Table 5: ICSOL; neoplastic and neoplastic lesions confirmed histopathologically**

ICSOL	All cases		
	Males	Females	Total
Neoplastic lesions			
Meningiomas	22	16	38
Arteriovenous malformation	4	1	5
Germ cell tumours	1	0	1
Metastatic tumours	4	3	7
Pituitary adenoma	19	8	27
Total	50	28	78
Non-neoplastic lesions			
Tuberculoma	11	6	17
Abscess	3	2	5
Total	14	8	22

ICSOL cases were confirmed histopathologically in sexes.

The male to female ratio of 1.7:1 in the present 100 cases corresponds to an overall male/female ratio ranging from 1:1 to 1:6 i.e. more males than females develop brain tumours.<sup>[13-15]</sup>

The total absence of cerebral lymphomas (either primary or secondary) in the present series is noteworthy, although the ratio of secondary brain tumours in the present series is near the limits estimated in the other series. Unexpectedly, the incidence of cerebral tuberculoma in the present series is less than the rates reported from India and Saudi Arabia and more than the other series from Kuwait, Germany and France.<sup>[16-20]</sup> The referral practice of lymphoma patients with the possibility of hospitals of preference might have helped eliminate these patients from this series. Since generalized spread, the lymphomatous meningitis, is the commonest intracranial manifestation of lymphoma, it is expected that most of these patients will escape neurosurgical attention as they do not require surgical intervention

A review of ICSOL, analyzed 13.7% meningiomas, which is a fairly low incidence as compared to our study. The meningiomas have a clear preponderance of females over males in our study, which is in agreement with majority of the other studies.<sup>[21]</sup>

Despite some limiting factors in this study only to histopathologically confirmed cases would have helped eliminate statistical errors potentially arising from erroneous diagnosis of unconfirmed lesions, such a measure may introduce other types of selection bias. In a country like Saudi Arabia where autopsies are extremely rare and limited to medico-legal cases, histopathologic studies are restricted to premortem operative specimens.

Consequently, the data obtained would not coincide with the real distribution of the various lesions in the examined population. The statistical errors introduced herewith are hardly predictable. In contrast, the possible error arising from pathologically unconfirmed cases is estimated to be small and limited. For this reason, the inclusion criteria in this series have not been based only on histopathologic confirmation. Yet, in studies based on the experience of a single referral hospital, selection biases cannot be avoided completely, since the referral procedure itself is a selective process which affects the composition of the admitted cases.

## CONCLUSION

Despite the different factors that may limit the validity of this study, the available data show that the pattern, as well as age and sex distribution, of ICSOL share several features with those reported from other countries. Thus in conclusion, this study has highlighted the relative frequency of different ICSOL at Al-Kharj province.

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