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# Value of Conventional Skull X-Rays Examination in the Evaluation of Patients with Space Occupying Lesions against Computed Tomography in Nigeria

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**ABSTRACT**

**Background**: Today, patients would like to know about their diseases and diagnostic/treatment choices available to aid their medical care.

**Purpose**: To assess the value of conventional skull x-ray examination in the evaluation of patients with intracranial space occupying lesion (SOL) in comparison with Computed Tomography brain scan.

**Materials and Methods**: A total of three hundred and forty four (344) radiographs and seventy two (72) scanograms were used. Radiographs of the skull which queried intra-cranial space occupying lesions, with good contrast and well demonstrated structures as well as an accompanying radiologists report were assessed for contribution to diagnosis, views for detailed information, cost-effectiveness and patient care/management. Findings were compared to computed tomography images of patients with the same conditions.

**Results**: The result showed that the contribution of skull x-ray for patients with suspected (SOL) was 48.55% as against 68.06% for CT scan. Lateral view had 51.50% as a better view against postero-anterior (PA) and other views showing 28.14% and 20.36% respectively.

**Conclusion**: This study showed that conventional skull x-ray should be supplemented by CT scan and other imaging modalities especially in developing countries like Nigeria. This is due to their non-availability and may be affordability by a large number of the populaces.

## INTRODUCTION

The overwhelming role in directing the activities of the human body rests with the nervous system [1]. It is composed of the central nervous system (CNS) and the peripheral nervous system (PNS) [2]. The nervous system has several unique anatomic and physiologic characteristics. As a result of these special characteristics, the CNS is vulnerably to unique pathologic process [3,4].

Any type of cell within the brain can undergo neoplastic change and give rise to a space occupying lesion (SOL) or Tumour [5]. Brain tumors account for 95% - 90% of all primary CNS tumours [6]. Roughly 10% of all tumour are located within the CNS, its meninge's and related structures, 80% occur within the cranial cavity and 20% in the spinal canal, brain tumour amount to less than 2% of all malignant neoplasms [4,7]. The average incidence of brain tumours from official population statistic worldwide is approximately 5 per 100,000 [8]. Statistics from Western Europe, North America and Australia shows great incidence of new cases of tumours per year [9 – 12] which accounted for 2.4% of all cancer deaths [13] and 20 - 25% of paediatric cancer.

Brain tumours vary in severity and their impact changes depending on where they are situated. With an increasing incidence of SOL, it therefore becomes imperative to have a proper diagnostic method that will aid the physician in the management and treatment of patients with SOL. With the advent of Computed Tomography (CT), Magnetic Resonance Imaging (MRI) and other modalities, plain skull radiographs have lost its pivotal role as the initial examination of the brain and skull [14 – 18]. Conventional x-ray imaging of the head has been supplemented and indeed largely superseded in the past 20 years by Tomographic techniques which have revolutonalized the imaging of the skull and brain [19]. But, in Nigeria, there is limited radiographic equipment like Computed Tomography (CT), Magnetic Resonance Imaging (MRI) and other modalities. Rather, we have x-ray equipment which are less expensive, readily available, as such, patients suspected to have SOL are recommended for x-ray examination of the skull in its evaluation.

Today, patients would like to know about their disease and diagnostic/treatment choices available to aid their medical care. It is against this background that this study aims to ascertain the value of conventional skull x-ray examination in the evaluation of patients with intra-cranial space occupying lesion (SOL) or tumour in Nigeria.

## MATERIALS AND METHODS

The value of conventional skull x-ray examination in the evaluation of patients with intra-cranial space occupying lesions in Nigeria was assessed by a non-experimental case study design.

A total of three hundred and forty four (344) cases of skull radiographs were

used. The criteria for selecting the radiographs include: Radiographs of the skull which query intra-cranial space occupying lesions, radiographs with good contrast and well demonstrated structures, radiographs with an accompanying radiologists report. The aspects of the evaluation considered in this study include: contribution to diagnosis, views for detailed information, cost-effectiveness and patient care/management [20].

On the basis of this satisfactory validation, the data reflect adequately the issues investigated to minimum distortion by subjective factors. By this, acceptable reliability measurements were taken based on Bull [21]. Also, the percentage result of the patient's with (SOL) was compared side by side with the percentage result of the contribution of computed tomography (CT) scan to patients with similar history.

## RESULTS

A total of three hundred and forty four (344) radiographs of the skull for patients suspected with (SOL) were critically examined. The contribution of skull x-ray examination to patients with (SOL) in the areas of diagnosis, cost effectiveness, patient care and general management is 48.55% for positive outcome (Table 1). The lateral view with 51.50% positive outcome proved a better view as against postero-anterior and other views with 28.14% and 20.36% respectively (Table 2).

**Table 1:** Contribution of skull x-ray examination to SOL diagnosis.

| | Areas of interest | Positive cases | Negative cases |
|---|---|---|---|
| 1 | Contribution to diagnosis | 167 | 177 |
| 2 | Cost effectiveness to patient | 167 | 177 |
| 3 | Patient care and general management | 167 | 177 |
| | **Percentage of contributions** | **48.55%** | **51.45%** |

The contribution of CT scan to the evaluation of (SOL) is 68.06%) (Table 2).

## DISCUSSION

The study proposition was to evaluate the value of skull x-ray in cases of intracranial space occupying lesion (SOL). From the results, 48.5% of the cases representing 167 radiographs with the (SOL) query on the request form proved positive from the radiologist's report. 51.45% of the cases representing 177 radiographs proved negative. This has wide implication and creates a problem of accuracy of diagnosis based on clinical findings and radiology. The data collected and analyzed revealed that skull x-ray examination for the evaluation of patients with SOL is not so much effective and efficient in this age and time when medical technology is advancing. This agree with Attah [15] and Sutton & Young [16]. According to Barker *et al* [17] , plain skull x-ray for diagnosis

led to false negative diagnosis in 66% of 374 cases.

Lateral view of the skull with 51.50% positive outcome proved a better view in the diagnosis of Sol. The results also showed that skull x-rays contributed less to the cost of patient care than any other diagnostic tool studied. Their contribution to diagnosis was below average (48.55%) and had little effect on diagnostic decision. According to Wagner & Krieger [20], conventional skull x-ray was costed at some 11%, which indicates its being economical. Bull [21] suggested that restriction of routine skull x-rays to a lateral film of first class quality was both diagnostically adequate and economical, noting that a significant abnormality can be revealed by plain skull x-rays in about 55% of patients with intra-cranial tumours.

**Table II: Conventional skull x-ray views and CT scan in SOL diagnosis**

| | **Projections** | **Number** | **Percentage** |
|---|---|---|---|
| 1 | Posterior anterior | 47 | 28.14% |
| 2 | Lateral | 86 | 51.50% |
| 3 | Others | 34 | 20.36% |
| | **Total** | **167** | **100%** |
| 4 | C.T. Scan | Positive cases – 49 | 68.06% |
| | | Negative cases – 23 | 31.94% |
| | **Total** | **72** | **100%** |

A follow up of patients who had CT-scan of the skull showed that it gave a better evaluation of intracranial SOL (68.06%) (Table 2). This percentage is quite supported by Raichile [19] who said that conventional x-ray imaging of the head has been supplemented and indeed largely superseded in the past 20 years by tomographic techniques example CT scan which had revolutionalized the imaging of the skull and brain.

In conclusion, since the development of computed tomography (CT), and Magnetic Resonance Imaging (MRI), plain skull radiographs now seldom give additional information in the evaluation of CNS diseases and have lost their pivotal role as the initial examination of the brain and skull [14]. Hence, conventional skull x-ray examination should not be completely discarded especially in developing economies due to non-availability of CT-scan in most centres but only supplemented by CT scan and other modern imaging modalities.

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