Med. Cairo Univ., Vol. 65, No. 1 (Suppl.), March: 111-116 , 1997.

# Localisation of Intraoccular and Intraorbital Foreign Bodies Using Computed Tomography

AHMED M. OUF, M.D.; OMAR M. OSMAN, M.D.;
SALAH M. KORYEM, M.D.; MAHMOUD ABO EL FADL, M.D. and
GOUDA KHALIFA, M.D.

*The Radiology Department, Faculty of Medicine, Al-Azhar University.*

**Abstract**

Accurate localisation of foreign bodies in the region of the orbit is vital for correct management. Computed tomography is recommended as the investigation of choice following a plain radiograph in cases of suspected ocular injury by a metallic foreign body.

***Key Words*** *:Intraocular-Intraorbital-CT-Foreign bodies*

## Introduction

**THE** aim of this work is to exclude or confirm the presence of foreign body and to obtain accurate localisation and to detect any associated soft tissue or bony injury.

CT protocols involving multiple projections[1], and three dimensional reformating[2], have been described. In this paper a simpler protocol for CT demonstration and localization of intraocular F.B. following ocular injury is suggested and the results in 15 patients are described.

## Patients and Methods

Between 1992 and 1995, 15 patients with suspected intra-orbital foreign bodies underwent CT in El Hussien and Bab El Sharia Radiology Departments.

In each case the presence, number and sites of any F.B. were encountered together with the presence or absence of associated soft tissue or bony injury. The scans were compared with other modalities obtained prior to CT.

Surgical follow up was obtained in 11 cases.

## Results

The details of the patients, CT technique and findings are presented in Table (1).

Table (1): CT findings and technique

| Case | Age | Sex | Number of F B | Site of F B | Associated Abnormality On C T | Findings in plain films |
|---|---|---|---|---|---|---|
| 1 | 47 | M | 1 | Globe wall/extra ocular | Soft tissue thickening anteriorly | + |
| 2 | 10 | M | 2 | Intraocular | Soft tissue thickening anteriorly | + |
| 3 | 35 | M | 2 | Right intraocular Left extraocular | -- | + |
| 4 | 19 | M | 1 | Intraocular | Vitreous haemorrhge | + |
| 5 | 22 | M | 1 | Intraocular | Haemorrhge inferior to globe | + |
| 6 | 35 | M | 1 | Intraocular | Vitreous haemorrhge | + |
| 7 | 63 | M | 3 | (1) Intraocular (2) Extraocular | Soft tissue thickening Vitreous haemorrhge | + |
| 8 | 72 | F | 1 | Globalwall/ extraocular | -- | Equivocal |
| 9 | 52 | M | 1 | Intraocular | Soft tissue thickening anteriorly | + |
| 10 | 15 | M | 1 | Infratemporal fossa | -- | + |
| 11 | 23 | M | 1 | Equivocal-due to artifact | Soft tissue thickening | + |
| 12 | 18 | M | 1 | Intraocular | Vitreous haemorrhge Gas in globe | + |
| 13 | 9 | M | 6 | - Intra ocular - (2) Corneal. - (1) Scleral. - (2) Anterior to orbit | Soft tissue thickening | Equivocal |
| 14 | 9 | F | 2 | Extraocular | Soft tissue thickening | + |
| 15 | 38 | M | 1 | Intracular | Vitreous haemorrhge | |

One or more F.B. were demonstrated by CT in all patients, in case No. 10 patient suffered an air gun pellet injury to the left eye, the F.B. lay anterior to the left temporomandibular joint, there was no evidence of F.B. in the orbit on CT.

In the other 14 cases F.B. were intraocular in seven and extra ocular but intraorbital in one. In three cases both intraocular and intra-orbital F.B. were present. In two cases F.B. were in or very closely related to the outer margin of the wall of the globe one of these was surgically explored and the extra-ocular site of F.B. was confirmed, the other patient was managed conservatively (Fig. 2).

In case 11 artifacts from a large metallic F.B made interpretation of CT impossible since an intra ocular component could not be excluded (Fig. 3).

In nine patients 6 mm axial scans were performed, in the remainder 3 mm axial scans were done. In the other two cases, where F.B. was only visible on 3 mm sections plain films had been equivocal. In one of these patients (case 13) CT showed a tiny intra ocular FB which was not visualised at initial operation (Fig. 4). A second operation confirmed its presence. Coronal scan done in 12 cases had clarified the position of F.B. relative to wall of the globe or orbit.

CT demonstrated associated soft tissue abnormalities in 12 patients and vitreous haemorrhage within posterior chamber in 6 patients.


Fig. 1. Axial CT of an intraocular FB (arrow) adjacent to the posterior wall of the left globe.

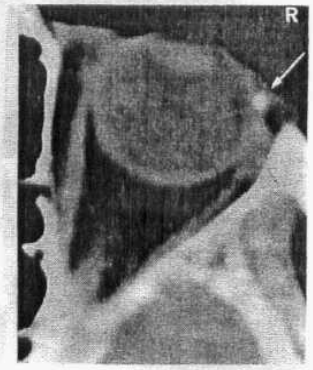


Fig. 2. Axial CT of an extraocular F.B. (arrow) anterior to the anterior attachment of the lateral rectus.

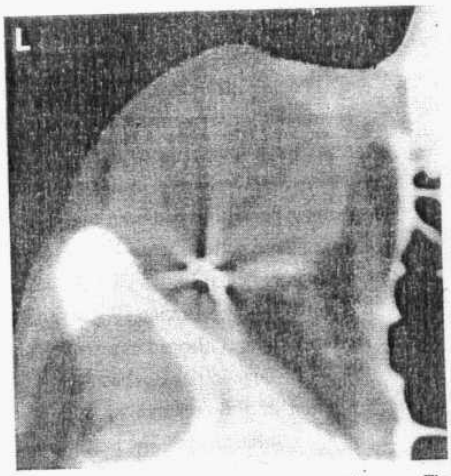


Fig. 3. Axial CT (case 11) where scan artifact prevents accurate localisatin of F.B.


Fig. 4. Axial CT showing a tiny left imtraocular F.B. not seen at surgery following the CT scan but removed at a later operation.


Fig. 5. Coronal CT showing an intraocular F.B. (straight arrow). Vitereous haemorrhage (open arrow) and intravitreal gas (arrow head).

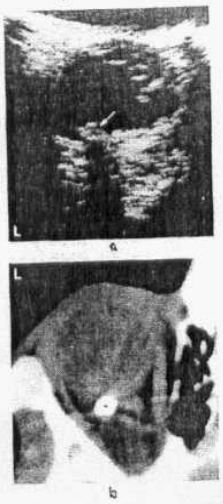


Fig. 6. (a) Ultrasonography of the globe showing an intraocular F.B.

(b)Axial CT of the same case shows the F.B. to be extraocular.

## Discussion

Intra-orbital foreign bodies are relatively uncommon. In this study of patients under18 years, 4 out of 5 were injured in accidents involving guns. In patients over 18 years 7 out of 10 resulted from occupational accidents.

Haemorrhage and infection complicate both intra ocular F.B.[3]. However, perforation of the globe is associated with specific complications such as sympathetic ophthalmitis, vitereous haemorrhge with subsequent vitreous fibrosis and retinal detachment[4].These complications can cause irreversible damage to vision.

Clinical management of foreign bodies depends on their nature and site; extra ocular metallic F.B are usually manged conservatively. Intraocular FB are usually removed because of the potential complications noted above.

Any localization method should be capable of differentiating between intra ocular and extra ocular F.B. and able to demonstrate the precise site of the FB before exploration.

Over 60 localisation methods have been described[5]. These methods relate movement of the FB to movements of the eye. They are often incapable of differentiating FB which lie just within the globe from those which are just outside it.

Ultrasonography may be useful in the detection and localisation of low density F.B. However, ultrasound is less sensitive than CT for the demonstration of FB in the globe[1]. Ultrasound may not demonstrate FB in the posterior orbit[6]. False diagnosis of an intraocular FB can be produced on ultrasound by vitreous haemorrhage or retinal elevation. In case 1 of this study ultrasonography appeared to demonstrate an intraocular FB (Fig. 6A). CT showed that it was clearly extraocular (Fig. 6B) and this was confirmed at surgery.

There have been several reports of the usefulness of CT in detection and localisation of foreign bodies[7]. Its advantages of being noninvasive, the relative lack of operator dependance and improved contrast resolution over plain radiographs are well recognised.

In the present study CT confirmed the presence of foreign bodies in all cases and accurately localized them in 14 out of 15 patients. All the foreign bodies were of metal density, all scans took less than 20 minutes to perform and minimal patient discomfort.

A previous report[1] described a scanning protocol involving 3 mm axial and 3mm coronal scans. Another report[2] described a three dimensional localisation and characterisation programme involving 2mm contiguous axial scans. Their paper suggests that in the ideal situation CT scanning should be performed in multiple planes particularly axial, coronal and sagittal[2].

The present study suggests that these

protocals are excessively complex and involve unnecessary radiation exposure. In this study a FB visible was demonstrated on contiguous axial 6 mm thick CT sections in all cases. Three millimeters thick slices were only necessary if plain radiograph was equivocal.

Coronal scans did not significantly aid interpretation in these patients and are felt to be unnecessary unless the position of the FB cannot be interfered from the axial scans.

## References

1. LINDAHL, S.: Computed tomography of intra-orbital foreign bodies. Acta Radiologica, 28, 235-240, 1989.
2. ZINREICH, SJ. and MILLER, NR.: Computed tomography three dimensional localisation of intraocular and orbital foreign bodies. Arch. Ophthalmol., 104, 1477-1482, 1986.
3. BARTKOWSKI, S. KURECK, STYPULKOWSKA J. and KRYSTKOWA KM.: Foreign bodies in the orbit., J. Maxillo. Fac. Surg., 12, 97-102, 1991.
4. MILLER, SJH.: Parsons Disease of the Eye P-249, Churchill Livingstone, Edinurgh, 1984.
5. ERKTO, W and DOLAN, KD.: Ocular Foreign body localisation, Radiol. Clin. N. Am., 10, 101-107, 1989.
6. MC. QUOWN, DS.: Ocular and orbital echography. Radiol. Clin. N. Am., 13, 523-541, 1985.
7. MANDELCORN, MS and BROW M.: Computed axial tomography localisation of intraorbital foreign body. Canad. J. Ophthalmol., 13, 212-215.

# أستخدام الأشعة المقطعية لتحديد مكان الأجسام الغريبة داخل حجاج العين أو داخل العين

د . احمد مصطفى عوف ، د . عمر محمد عثمان ، د . صلاح الدين محمد كريم ،
د . محمود أبو الفضل ، د. جودة خليفة

كان الهدف من هذه الدراسة هو تحديد موضع ومكان اى اجسام معدنية غريبة داخل محجر أو داخل العين نفسها تحديدا دقيقا باستخدام الأشعة المقطعية بعد تصوير العين بالأشعة السينية العادية.

تم عمل هذا البحث على (١٥) خمسة عشر مريضا فى مستشفى الحسين الجامعى ومستشفى باب الشعرية الجامعى باشتباه وجود أجسام غريبة فى عيونهم وتم عمل فحص لهؤلاء المرضى بالأشعة المقطعية فى أوضاع مختلفة وكذلك باستخدام الأشعة المقطعية ذو الأبعاد الثلاثية لتحديد الموضع الدقيق وعدد هذه الأجسام الغريبة وكذلك اصابات عظام محجر العين أو وجود تغيرات فى الأنسجة الرخوة للعين ، وتمت مقارنة هذه النتائج مع الفحوصات السابقة للأشعة المقطعية.

نستخلص من هذا البحث ان فحص العين بالأشعة المقطعية فى الأوضاع الرأسية (العمودية) حيث تكون سمك المقاطع أثناء تصوير العين مقطع كل ٦ مم ، حتى نستطيع ان نحدد وبدقة موضع الأجسام المعدنية الغريبة الموجودة بالعين وكذلك التغيرات بالأنسجة الرخوة للعين وماحولها أن وجدت نتيجة لأصابة العين لهذه الأجسام الغريبة.