Corneal reflex in hemisphere disease

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SUMMARY The contralateral corneal reflex may be absent in patients with a deep lesion of the parietal lobe. Frontal and temporal lobe lesions apparently do not interfere with this reflex.

The corneal reflex is part of the neurological examination. In lesions of the fifth and seventh cranial nerves, as well as intrinsic disease of the brain-stem, the integrity of the corneal reflex may contribute to the diagnosis.

The purpose of this paper is to show the corneal reflex as a superficial reflex, somewhat analogous to the abdominal reflexes, which may disappear in disease of the contralateral hemisphere. Oliver (1952) described three patients, each of whom had an intracerebral lesion and an abnormal corneal reflex. The first had a left intracerebral, frontoparietal haematoma with an absent right corneal reflex; the second a left frontoparietal tumour with an absent right corneal reflex, and the third, a right temporoparietal tumour with an absent left corneal reflex.

This paper of Oliver's seems to have had very little impact on the literature or standard neurological textbooks.

In De Jong's book, The Neurologic Examination (1967), the fact is not mentioned and in Brain's Diseases of the Nervous System by Brain and Walton (1969), it is also omitted. However, in the Handbook of Clinical Neurology (1969) the reduced or absent corneal reflex in disease of the contralateral hemisphere is mentioned briefly. Brodal (1969) mentions Oliver's paper in a footnote. Monrad-Krohn (1964) states that the corneal reflex may be lost in the presence of a suprasegmental intracerebral lesion.

The blink reflex has been studied by many authors. Magladery and Teasdall (1961) examined eight patients suffering from hemisphere vascular lesions and found a slightly increased latency when the cornea on the side of the hemiparesis was stimulated. The increase, however, was only a few milliseconds and the number of cases was thought to be too small for any valid conclusions.

In other studies of the blink reflex by Rushworth (1962), Bender (1968), Bender, Maynard, and Hastings (1969), Kimura, Powers, and Van Allen (1969), and Young and Shahani (1969), there are few, if any, references to hemisphere lesions affecting the reflex on the appropriate side.

The following are brief summaries of 13 patients, all with intracranial lesions and some with an absent corneal reflex on the appropriate side.

ABSENT CORNEAL REFLEXES

MR. S. E. (Hospital no. 307606) This 24 year old school teacher presented with a one year history of left sided Jacksonian sensory fits and difficulty in fine movements involving the use of his left hand.

Examination revealed bilateral papilloedema, an absent left corneal reflex, and a gross sensory disturbance of the left side of his body. There was diminished pain sensitivity, astereognosis, inaccurate number writing sensibility, and a two point discrimination was at 12 mm on the tip of his index finger compared with 3 mm on the right. His left arm and leg were weak, ataxic, and he had a left extensor plantar response.

Investigations revealed a large, deep, cystic astrocytoma in the parietal region.

MRS. E. P. (Hospital no. 307596) She was a 61 year old housewife who had been stricken with a severe occipital and frontal headache and vomiting, and within half an hour became unconscious. Examination revealed a comatose lady with stiff neck, and
bilateral extensor plantar responses. About two weeks later she had recovered from the subarachnoid haemorrhage and examination was normal. Carotid angiography revealed a multilobed aneurysm of the left middle cerebral artery just proximal to the trifurcation. At surgery the aneurysm ruptured necessitating a clip on the main trunk of the middle cerebral artery. Postoperatively she showed a dense right hemiparesis, almost total sensory neglect, aphasia, and an absent right corneal reflex. Postoperative angiography showed the avascular territory of the middle cerebral with little collateral filling from other vessels.

The absent corneal reflex persisted up to six weeks after the operation. During this time her speech began to return and her leg improved to the point of standing and walking with assistance.

**Mrs. M. M. (Hospital no. 307684)** This 59 year old housewife was found unconscious. On examination she was comatose, responding only to deep pain, and then only when the painful stimulus was applied to the right side of her body. Over the next 10 to 12 days she gradually wakened and revealed a left hemiplegia, absent left corneal reflex, and left extensor plantar response. Carotid angiography revealed an occlusion of the right middle cerebral artery at its origin. A thrombus was seen in the distal portion of the carotid artery. Anastomotic circulation into the infarcted area was negligible. Several weeks after admission when she was fully conscious and making some recovery in her paretic leg, the corneal reflex on the left remained absent.

**Mr. J. M. (Hospital no. 354251)** This 81 year old retired man suddenly developed a paralysis of his left face, arm and leg with left homonymous hemianopia, absent left corneal reflex, and no disturbance in consciousness. Investigations revealed a thrombosis of his right internal carotid artery 1 cm beyond the bifurcation in the neck. No collateral circulation was seen from the external carotid system or the contralateral carotid artery. One month after onset there was no significant change in the hemiparesis and the left corneal reflex remained absent.

**Mrs. M. C. (Hospital no. 354287)** This 78 year old lady was admitted with a hemiparesis of sudden onset and no disturbance of consciousness. On examination she revealed paresis of left face, arm and leg, a left homonymous hemianopia, and an absent left corneal reflex. Investigations showed a thrombosis of her right internal carotid artery distal to the bifurcation in the neck. There was no collateral filling from the external carotid or the contralateral carotid artery. Nine days after admission she died from a pulmonary embolus. There had been no change in her neurological findings up to this time.

**Intact Corneal Reflexes**

**Mr. E. S. (Hospital no. 256006)** This 40 year old roustabout began to complain of anginal pain in 1968 and in December 1971 was admitted with a myocardial infarct. Four days after admission he lost his speech and was found to have a paresis of his right face, arm and leg. Visual fields were probably normal as was his sensory examination. The paresis was most marked in face and hand. Investigations revealed what was probably an embolic occlusion of the posterior parietal branch of the left middle cerebral artery. Both corneal reflexes were present, although the response of the right was slower than the left. (First neurological examination was about 50 hours after the stroke). Five days after the cerebral event the corneal responses were normal and equal and the dysphasia and hemiparesis were about 75% recovered. One wonders if the right corneal reflex might have been absent had he been examined in the first 24 hours of this illness.

**Mr. J. E. (Hospital no. 308312)** This 20 year old cab driver had a six month history of increasing frontal and occipital headache, intermittent vomiting, and photophobia. Examination revealed bilateral papilloedema, full visual fields, and weakness and slowness on voluntary movement of the lower portion of his left face. His corneal reflexes were present and equal. His left hand and arm were clumsy and incoordinated for fine, rapid, alternating, movements and the left hand was weak. Two points applied to his right index finger could be distinguished when separated by 2 to 3 mm while they merged on the left index finger when separated by 5 to 6 mm. Investigations revealed a menigioma, 7 cm in diameter, overlying the convexity of the right hemisphere. About 80% of the tumour was anterior to the Rolandic fissure. The anterior cerebral vessels were shifted 12 mm to the left of the mid line.

Postoperatively his face and arm were weaker for about 10 days. Several examinations during this time showed both corneal reflexes intact. Two points applied to his left index finger merged at 11 to 12 mm separation.

Three patients with unilateral subdural haematoma were examined. They showed various degrees of unconsciousness and minimal local signs of intracranial disease. Their mid-line vascular structures were shifted between 4 and 12 mm away from the midline. One haematoma was frontal, the other two
### SUMMARY

<table>
<thead>
<tr>
<th>Patient + complaints</th>
<th>Lesion</th>
<th>Location</th>
<th>Corneal reflexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. S. E.</td>
<td>Right parietal cystic glioma</td>
<td></td>
<td>Rt. = present</td>
</tr>
<tr>
<td>Left-sided Jacksonian sensory fits</td>
<td>Lt. = absent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mrs. E. P.</td>
<td>Surgical clip on left middle cerebral artery at origin</td>
<td></td>
<td>Rt. = absent</td>
</tr>
<tr>
<td>Postoperative right hemiplegia</td>
<td>Lt. = present</td>
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<td></td>
</tr>
<tr>
<td>Mrs. M. M.</td>
<td>Occlusion of right middle cerebral artery</td>
<td></td>
<td>Rt. = present</td>
</tr>
<tr>
<td>Acute left hemiplegia and coma</td>
<td>Lt. = absent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr. J. M.</td>
<td>Occlusion of right internal carotid artery in neck</td>
<td></td>
<td>Rt. = present</td>
</tr>
<tr>
<td>Acute left hemiplegia</td>
<td>Lt. = absent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mrs. M. C.</td>
<td>Occlusion of right internal carotid artery in neck</td>
<td></td>
<td>Rt. = present</td>
</tr>
<tr>
<td>Acute left hemiplegia</td>
<td>Lt. = absent</td>
<td></td>
<td></td>
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<tr>
<td>Mr. E. S.</td>
<td>Occlusion of posterior parietal branch of left middle cerebral artery</td>
<td></td>
<td>Rt. = slow</td>
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<tr>
<td>Myocardial infarction plus right hemiparesis and aphasia</td>
<td>Lt. = present</td>
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<tr>
<td>Mr. J. E.</td>
<td>Right parietocentral convexity meningioma</td>
<td></td>
<td>Rt. = present</td>
</tr>
<tr>
<td>Headaches, vomiting and photophobia</td>
<td>Lt. = present</td>
<td></td>
<td></td>
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<tr>
<td>Three patients with headache and drowsiness. Variable, minimal, localizing signs of intracranial disease</td>
<td></td>
<td></td>
<td>Rt. = present</td>
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<tr>
<td>Subdural haematoma</td>
<td>Lt. = present</td>
<td></td>
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<tr>
<td>Mrs. E. F.</td>
<td>Right fronto-temporal glioma</td>
<td></td>
<td>Rt. = present</td>
</tr>
<tr>
<td>Progressive lethargy, confusion, and left hemiparesis</td>
<td>Lt. = present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr. K. F.</td>
<td>Left mid-temporal astrocytoma</td>
<td></td>
<td>Rt. = present</td>
</tr>
<tr>
<td>Psychomotor seizures, dysphasia, and right facial weakness</td>
<td>Lt. = present</td>
<td></td>
<td></td>
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<tr>
<td>Mr. R. R.</td>
<td>Right fronto-temporal glioma</td>
<td></td>
<td>Rt. = present</td>
</tr>
<tr>
<td>Progressive mental slowing, headache, and left-sided weakness</td>
<td>Lt. = present</td>
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</table>

**FIGURE** The cases are summarized in the Figure.
were centroparietal. None of these patients exhibited slow or absent corneal reflexes at any time in their hospital stay.

MRS. E. F. (Hospital no. 121567) This 81 year old lady was admitted with a six month history of progressive lethargy, confusion, and a slowly progressive paresis of her left face, arm, and leg. No papilloedema was seen, her visual fields were full, and both corneal reflexes were present. Investigations showed a large frontotemporal glioma. Postoperatively the both presented patients showed the absence of the left corneal reflexes. The absent corneal reflex was the first or major physical sign of a subcortical, parietal lesion.

MR. K. F. (Hospital no. 240331) This 62 year old school teacher was first seen one year earlier because of several generalized epileptic seizures. All investigations at that time were normal. In October 1971 he was seen again because of confusion, psychomotor seizures, and headaches. Examination showed a moderate expressive dysphasia, weakness of the lower portion of his right face, and bilaterally normal corneal reflexes. Investigations showed a left mid-temporal astrocytoma. Postoperatively the corneal reflexes were both present.

MR. R. R. (Hospital no. 307358) This 61 year old pulp cutter was admitted with a six month history of progressive mental deterioration, headache, and weight loss. Examination showed a confused, drowsy man with paresis of left face, arm, and leg, and bilateral papilloedema. Both corneal reflexes were present. Investigations showed a large, cystic, avascular, right temporal lobe tumour which at surgery was found to be a glioblastoma. Postoperatively his corneal reflexes were unchanged.

CONCLUSIONS
The absent corneal reflex can be a sign of cerebral disease. From the small number of patients presented here, deep lesions of the parietal lobe seem most likely to result in an absent contralateral corneal reflex.

Frontal and temporal lobe lesions apparently do not interfere with this reflex. Similarly, superficial lesions—in this series represented by a convexity meningioma and three subdural haematomata—do not interfere with the corneal reflex.

All the patients described with absent or slowed corneal reflexes had other unequivocal signs of intrinsic hemisphere disease. No patients have been seen in whom the absent corneal reflex was the first or major physical sign of a subcortical, parietal lesion.

REFERENCES
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