On the condition of the knee-jerk, ankle-clonus, and plantar reflex, after epilepsy in seventy fits : and on post-epileptic conjugate deviation of the eyes / by Charles E. Beevor.

With the author's compliments

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ON THE CONDITION OF THE

KNEE-JERK, ANKLE-CLONUS,

AND

PLANTAR REFLEX,

AFTER EPILEPSY IN SEVENTY FITS;

AND ON

POST-EPILEPTIC CONJUGATE DEVIATION OF THE EYES.

BY

CHARLES E. BEEVOR, M.D. Lond., M.R.C.P.,

LATE RESIDENT MEDICAL OFFICER TO THE NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC.

[*REPRINTED FROM "BRAIN," Part XVII.*]

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ON THE CONDITION OF THE KNEE-JERK, ANKLE-CLONUS, AND PLANTAR REFLEX AFTER EPILEPSY IN SEVENTY FITS; AND ON POST-EPILEPTIC CONJUGATE DEVIATION OF THE EYES.

BY CHARLES E. BEEVOR, M.D. LOND., M.R.C.P.,

Late Resident Medical Officer to the National Hospital for the Paralysed and Epileptic.

THE presence of ankle-clonus and excessive knee-jerk (patellar tendon reflex) after epileptic fits was first pointed out by Dr. Hughlings-Jackson in a case of unilateral convulsions, which was recorded by him in the 'Medical Times and Gazette' for February 12th, 1881.

While Resident Medical Officer at the National Hospital for the Paralysed and Epileptic, Queen Square, I was asked by Dr. Hughlings-Jackson, and also by Dr. Gowers, to make observations as to the presence of ankle-clonus and the knee-jerk after epileptic seizures, and the following results were obtained by personal observation of seventy fits occurring in thirty-one different patients. I have to thank the physicians under whose care these cases were, for allowing me to record the following observations.

To obviate as much as possible any source of error, I took myself, or dictated, notes at the time, and directly afterwards copied them out in full. The knee-jerk was tested with a heavy vulcanite stethescope, with a ring of india-rubber round the disc, as advised by Dr. Buzzard, instead of trusting to the rougher method by striking with the edge of the hand.

The plantar reflex was tested by a sharp quill-pen, and the ankle-clonus was tried with the knee at various angles, as it

is obtained best with different degrees of tension of the calf-muscles.

The cases have been divided into those which were observed *instantly*—where the whole of the fit was observed, or at least the end of the clonic stage was witnessed—and into those which were seen *directly*, where perhaps 1 to 2 minutes might have elapsed, but always before the patient showed any signs of returning consciousness. The time at which the various phenomena showed themselves or disappeared was taken by a watch, and the probable duration was not roughly guessed at.

The cases may be arranged in a table:—

	Seen instantly after Clonic Stage.	Directly after Clonic Stage.	Total.
Knee-jerk increased and ankle-clonus present	27	11	38
Knee-jerk diminished, ankle-clonus absent	6	7	13
Knee-jerk absent, ankle-clonus absent	3	8	11
Knee-jerk normal, no ankle-clonus	4	1	5
Knee-jerk diminished, ankle-clonus present	2	0	2
Knee-jerk normal, ankle-clonus present	1	..	1
Total	43	27	70

In all the above cases the phenomena were obtained on both legs.

In all these cases the plantar reflex was absent instantly after the clonic stage, but it returned in from 3 to 13 minutes, the average time being about 5 minutes; the time at which the ankle-clonus passed off was also noted by a watch, and seemed to correspond to the time of return of the plantar reflex, and in 10 out of 15 cases in which the times of the disappearance of the ankle-clonus and the appearance of the plantar reflex were taken, it was found that the two coincided approximately.

In one of the cases seen instantly, in which the knee-jerk was increased, there was no ankle-clonus.

In one of the cases in which the knee-jerk was diminished

and there was no ankle-clonus when tried instantly, in 6 minutes the former became excessive and the latter was also well obtained; and in two cases where the knee-jerk was diminished, when observed directly after the clonic stage, it was found to be increased in a few minutes.

Of the three cases where both phenomena were looked for instantly and were absent, one was doubtful, and in the eight observed directly two were doubtful, and in one the knee-jerk was present in 5 minutes' time, while in another both phenomena were very well obtained in 8 minutes. The two apparently anomalous instances of the presence of ankle-clonus and diminution of the knee-jerk were observed twice in the same patient.

In all the above cases, the fits were ordinary bilateral epileptic attacks, beginning as a rule with rotation of the head and turning of the eyes towards one side, and after some of the attacks the ankle-clonus and the knee-jerk were decidedly more active on the side to which the initial rotation of head and eyes occurred.

In the intervals of ordinary bilateral attacks the knee-jerk is usually obtained on both sides more readily than normally, but there is no ankle-clonus.

Besides the foregoing observations on the knee-jerk and ankle-clonus after epileptic fits, I have also had the opportunity of observing another phenomenon, viz. conjugate deviation of the eyes occurring instantly *after* the clonic stage of the fit is over.

A short notice of this phenomenon was given in the 'British Medical Journal' for January 21st, 1882; but I propose to give a fuller account of it in this paper. The explanation of it will, I believe, be better obtained by drawing an analogy between this phenomenon and the conjugate deviation of the eyes which is a known symptom in some cases of recent hemiplegia.

In cases of hemiplegia, after a recent lesion in one hemisphere, the symptom of conjugate deviation of the eyes and rotation of the head to one side is frequently noticed, by which it is meant that the head and eyes are turned towards the same side as that half of the brain in which the lesion is situated, and consequently away from the side of the limbs and face which are the seat of paralysis, so that a lesion in the

left hemisphere causes paralysis of the right side of the body, and conjugate deviation of the eyes and rotation of the head to the left. This symptom has been explained by the theory that the muscles of the eye on the paralysed side—the right in our supposed case—are unable to antagonise and prevent the healthy muscles from drawing the eyes in a parallel manner towards the unaffected side, i.e. the left. I have not been able to find out that any previous observations have been made with regard to the presence of conjugate deviation of the eyes *after* epileptic fits. My attention was first drawn to the point by a case of Dr. Gowers' which I saw at the patient's own home; the man had had thirty or forty fits in about twelve hours, and when I saw him he had marked conjugate deviation of the eyes and rotation of the head to the left; the fits, his friends assured me, began with turning of the head and eyes to the right and the convulsions were right-sided. As soon as the fit was over the head and eyes turned to the left and remained there till the next fit, when they again turned to the right, to again assume the position to the left after it. It then occurred to me that I ought to find conjugate deviation of the eyes or rotation of the head in ordinary bilateral epileptic fits, for one side of the body is nearly always affected more than the other. I have looked for these phenomena in every case since, and I have taken notes at the time to obviate any source of error.

In an ordinary epileptic fit the tonic stage usually (if not invariably) begins by rotation of the head and turning of the eyes to one side—say to the right—and sometimes with flexion of the elbow and wrist of the same side as that to which the head turns. This tonic spasm is followed by clonic spasm, in which, perhaps, the two sides of the body are convulsed apparently equally. Directly all movement has ceased and the patient lies with the limbs relaxed, the eyes will be noticed to roll slowly over to the opposite side—which in our supposed case would be to the left—and they remain there from $\frac{1}{2}$ to 2 minutes. In thirteen consecutive fits where this post-epileptic deviation has been looked for, I have noticed it in eleven, and in one case the eyes have simply gone back to their natural position and have not passed to the opposite

side; in only one case have the eyes remained in the same position in which they turned in the primary tonic spasm, and this was a very slight fit. The *head* either remains in the same position as it assumed during the attack, or returns to the front. I have not yet seen the head rotate to the opposite side, after the end of the clonic stage, in universal bilateral fits, though I have witnessed it in an unilateral attack.

It is known that paralysis (either transient or permanent) occurs after some epileptic attacks, and most commonly in unilateral fits; the presence of any paralysis in an ordinary epileptic fit cannot be ascertained, for the reason that, by the time that the patient has recovered sufficient consciousness to use the dynamometer, the paralysis has passed off. I believe that the presence of the conjugate deviation of the eyes shows that the side where there is the primary discharge, and on which, presumably, the spasms are more severe, becomes more exhausted than the side where there is less discharge, and the eyes are drawn to the side where the muscles are the less exhausted. The head does not rotate, for the reason, I believe, that there is not sufficient difference of power between the two sides to affect this, while the eyes being very mobile are very exact indicators of the difference in the paralysis of the two sides.

In one patient of Dr. Ramskill's, the head and eyes first turned to the right, she was then clonically convulsed on both sides of the body, and while the clonic spasms were continuing the head and eyes went to the left; after all movement had ceased, the eyes and head rotated back again to the right and remained there for a few seconds; the head then turned straight and then the eyes rotated from side to side, keeping parallel; thus seeming to show that the side on which the discharge last occurred was the more paralysed directly after the clonic stage, and not necessarily the side where the primary discharge took place.

Another phenomenon which I have observed is, that, after the conjugate deviation has lasted for ½ to 2 minutes, the eyes sometimes—for 10 minutes—roll slowly from side to side, keeping parallel, and they also seem to wait longer on the side towards which they first conjugately deviated; during this time the pupils frequently oscillate. Perhaps this may be

explained by an irregular return of power and recovery from exhaustion in the two hemispheres of the brain, the one predominating over the other in turn. I have observed this rolling of the eyes from side to side in about half the cases in which it was looked for.

The foregoing post-epileptic phenomena, I think, seem to show that there is a great similarity between the state immediately following an epileptic fit and the condition which is found in a case of recent hemiplegia, a fact which has frequently been pointed out before in unilateral fits, in which temporary paralysis of the affected side is not uncommon. I believe the same analogy can be applied to *all* bilateral epileptic fits; for in these last there is usually, instantly after the clonic stage, deviation of the eyes, increased knee-jerk and ankle-clonus, and absence of the plantar-reflex, and it seems probable that the same condition which produces permanently in cases of hemiplegia these phenomena, viz. excessive knee-jerk, ankle-clonus, and absence of superficial reflexes, is also present, though for a much shorter period, i.e. for a few minutes, directly after epileptic attacks, and when these are bilateral the above phenomena are obtained on both sides, with the exception that the post-epileptic deviation of the eyes occurs towards the side of less paralysis.

It would seem, therefore, that, after an epileptic seizure, the brain and spinal cord are reduced, probably by exhaustion due to the excessive motor discharge, to the condition which is obtained in cases of hemiplegia, for in both there is usually excessive knee-jerk and ankle-clonus and absence of plantar-reflex. In reference to the latter, I have had the opportunity of observing, in a case mentioned by Dr. Gowers in his work on epilepsy, where the patient was clonically convulsed on the right side for 20 minutes (by the watch), that instantly after the fit the knee-jerk was more marked on the right than on the left, and the plantar reflex was obtained on the left side in 3 minutes after all movement had ceased, but that on the convulsed side—the right—it was only obtained slightly in 30 minutes' time, and this case was followed by paralysis of the right side, from which he did not recover till an hour or two later, speech being also affected.