Differential Diagnosis between Functional and Organic Impotence by Radioisotope Penogram Following Visual Sexual Stimulation

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Following an increase in traffic and industrial accidents, the frequency of injury of the erecting nerve has increased, which often causes various problems regarding compensation for sexual disturbances. From the medical side, lack of the objective measure for differentiating the functional disturbances from the organic disturbances composes a big difficulty. Thus, the authors tried to introduce the radioisotope penogram to study the change of blood flow through the penis in an attempt to solve these difficulties, and some of the results have been reported (Shirai and Nakamura 1970, 1971).

The use of the radioisotope penogram with drug loading, made it possible to differentiate the presence or absence of organic disturbance below the level of the lower erection center in the spinal cord. But the normal erection phenomenon is controlled by centers which are located further up in the spinal cord (Beach 1947; Bors and Comarr 1960; Vaughan and Fisher 1962), and the available methods are insufficient to differentiate the presence of organic disturbance in the upper center from the disconnection between the upper and lower centers. In order to study whether the nervous system which participates in erection is intact or not, the authors observed the change in the radioisotope penogram curve following visual sexual stimulation.

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MATERIALS AND METHODS

Twenty patients, whose chief complaint was insufficient erection, were studied. In 16 of these 20 cases, no potential cause for organic impotence was indicated in their medical histories. In 2 cases, insufficient erection was noted after trauma. The remaining 2 cases were diagnosed and treated for schizophrenia and manic-depressive psychosis at the Department of Psychiatry.

An apparatus used for renogram with NaI (T1) crystal 2”×2”1 was used for the examination. A specially designed collimator was used to block γ-rays from sites other than the penis and to increase the counting efficiency. The feeding speed of recording paper was 10 mm/min, time constant 2 seconds, window width 364±36.4 Kev. $^{131}$I-human serum albumin and $^{113}$In-microcolloid were used, at the doses of 50 μCi and 500 μCi, respectively. Sodium iodide was administered orally prior to the examination, in order to block a possible exposure of the thyroid gland to the isotope.

While the patient laid in a supine position, the collimator was covered with filter paper and, to the extent possible, the penis was placed into the collimator (Fig. 1). To measure the background, another collimator was placed over the heart and pubic bone area.

The radioisotope penogram, which is a curve showing the change of the blood stream in the penis, was taken after the administration of isotope. Visual sexual stimulation was given after this curve became steady. The patient watched a pornography for a certain period of time, and the change of the penogram curve was observed. In all cases examined in the present study, the radioisotope penogram test by Fujicapin loading was carried out through subcutaneous injection of 1 ml Fujicapin; a yohimbine preparation containing 3 mg yohimbine hydrochloride, 8 mg methylalginate, 0.3 mg strichinine nitrate, and 18.7 mg glucose, followed by radioisotope penogram.

RESULTS

1) Penogram findings in cases which are entirely free from organic changes

Penograms were studied in 16 cases without organic changes related to impotence, such as trauma. A normal pattern was obtained in 15 of these 16 cases, when the Fujicapin loading penogram test was carried out before the visual sexual
Fig. 2. Penogram findings without any organic factors. The upper curve is control wave from control collimator. The lower curve is penogram. A remarkable rise is seen following visual sexual stimulation.

Fig. 3. Penogram findings without any organic factors. The upper curve is control wave from control collimator, which is placed over the pubic area. The middle curve is control wave from control collimator, which is placed over the heart area. The lower curve is penogram.

loading penogram test. Following the administration of Fujicapin, there was a rise in the penogram curve in all 15 cases. In these cases, a penogram was obtained following visual sexual stimulation and a time interval in order to compare it
Fig. 4. Penogram findings without any organic factors. The rise of the penogram curve is not pronounced.

with the penogram after Fujicapin loading. In the remaining case, Fujicapin loading was carried out immediately before visual sexual stimulation.

In 13 out of 16 cases, a marked rise in the penogram was observed following visual sexual stimulation, and its rise in the penogram was greater than that of Fujicapin loading (Figs. 2 and 3). In the 3 cases, however, the penogram curve was similar to the curve following Fujicapin loading, that is, the rise was less pronounced than in the other 13 cases (Fig. 4).

2) Penogram findings in cases with organic changes

In 2 cases, impotence occurred after the head trauma and complete body concussion caused by traffic accidents. No rise of the penogram curve was obtained following visual sexual stimulation (Figs. 5 and 6), although in both of these cases, intense sexual excitement was experienced in response to visual sexual stimulation.

3) Penogram findings in cases with probable psychosis

Patients diagnosed and treated for schizophrenia and manic-depressive psychosis were studied. In these cases, the penogram obtained after Fujicapin loading gave a positive response, or a rise of the penogram curve. A marked rise of the penogram curve was also noted in response to visual sexual stimulation (Fig. 7).

DISCUSSION

There are two classifications of erection. "Erotic erection" is induced when the erection center in the diencephalon receives visual, auditory, olfactory or
Fig. 5. Penogram findings with organic factors. The upper curve is control wave. The lower curve is penogram. No reaction is recognized after administration of Fujicapin.

Fig. 6. Penogram findings with organic factors. The upper curve is control wave. The lower curve is penogram following visual sexual stimulation.

intellectual stimulation of a cerebral nature through image; this leads to the excitation of the erection center of the spinal cord. "Reflective erection" occurs through a reflex mechanism involving the spinal cord center, which is unrelated to the higher center; erection upon filling of the urinary bladder is an example. The presence of such reflective erection is clinically important as an index for the
Fig. 7. Penogram findings with probable psychosis. The penogram curve of manic-depressive psychosis. A remarkable rise is recognized.

presence of a proper pathway below the erection center in the spinal cord. For the normal erection phenomenon to occur, the pathway below the lower erection center, in addition to the higher erection center with its connective pathway, must be intact. The erection phenomenon itself consists of a series of reflexes, unified by the lower centers in the brain stem and spinal cord. Most of the sexual acts accompanying erection are regulated by the limbic system and hypothalamus. The neocortex also participates in the sexual acts; sexual acts are known to be inhibited by an injury of the frontal lobe. The temporal lobe, particularly the amygdaloid nucleus and part of the pyriform lobe which is related to amygdaloid nucleus has a marked inhibitory influence on the sexual act. Destruction of this portion causes an excessive act (Kluver and Bucky 1939). Erection is caused by stimulation of the cortex of the posterior cingulate gyrus, and the part of the hippocampus which has intimate nerve connections with the sites of the limbic system which induce an excessive act (MacLean 1958; MacLean et al. 1960). The sexual act is an extremely complex physiological phenomenon related to numerous sites in the nervous system. For the performance of a normal sexual act, all these sites should be intact. In order to distinguish the functional and organic impotences, the authors previously introduced the penogram method following Fujicapin loading, that is, a method of observing the penile blood flow following drug administration. Although this method made it possible to distinguish whether the organic disturbance is present below the level of the lower erection center, it was impossible to investigate the state of the higher center. In addition to the penogram with Fujicapin loading, therefore, the authors studied on the changes in the penile blood flow after visual sexual stimulation, in order to clarify the state
of the higher center. Visual sexual stimulation was especially selected for this purpose, because Kinsey et al. (1953) emphasized the special role of visual stimulation in the sexual excitement of males. Levi (1969) confirmed this Kinsey’s theory. He showed sex films to 53 females and 50 male students in order to study the occurrence of sexual excitement and urinary excretion of adrenalin and noradrenalin. In comparison to the control group, urinary adrenalin excretion showed a marked rise in both groups, especially in males. While 21% of females entirely denied sexual excitement, only 4% of males denied it. Since visual stimulation thus appeared to be the best method of causing sexual excitement in males, the authors decided to study the change of penile blood flow following visual sexual stimulation.

In 13 of 16 cases without any organic changes, a marked rise of the penogram curve was obtained following visual sexual stimulation. In 3 cases, however, the rise of the curve was not pronounced. Rather, the rise was similar in degree to that after Fujicapin loading. The cause for such a poor response in these cases was studied. These patients failed to feel any sexual excitement in the present demonstration, because previously they had watched similar pornography. When visual sexual stimulation is given, such phenomenon of becoming accustomed to the stimulation should be taken into account. It should also be noted that sexual reaction to the same visual stimulation might vary depending on culture, religion, and other social factors of the person subjected.

It is possible that sexual excitement might lead to an increase of cardiac output, resulting in an increased blood flow through the penis and a rise of penogram curve. This possibility is eliminated by the absence of change in the control curve obtained by placing the collimator on the heart area following exposure to visual sexual stimulation.

In 2 cases with organic changes, the penogram failed to show any response to visual sexual stimulation, although these 2 cases, experienced intense sexual excitement after viewing pornography. The changes in the penogram thus appear to be induced only by stimuli via the nervous system. The absence of change in the penogram curve in these 2 cases would indicate the indispensable role of the nervous system participating in erection, although visual sexual stimulation may also cause sexual excitement and an markedly increased secretion of adrenalin or noradrenalin as stated by Levi.

In both of these 2 cases in the present series, no reaction was seen on the penogram after Fujicapin loading; it cannot be determined that the higher center was the only site injured. Fujicapin might act with considerable weight on the higher center as well as the lower center. At present, the exact mechanism and the site of action of Fujicapin remain unknown. In the future, it may be possible to study cases which have a definite disturbance in the higher center, showing a positive response to visual stimulation; that is, cases which exhibit a positive response to the Fujicapin loading in penogram but show no response in penogram after the visual sexual stimulation. In such cases, the effect of Fujicapin on the
lower erection center would be confirmed. At present, these present methods are not sufficient to locate the exact site of disturbance. However, the differentiation between functional and organic impotence, which is the authors' major objective, has been achieved by the combined use of the Fujicapin loading penogram and the visual sexual stimulation penogram.

In both cases of schizophrenia and manic-depressive psychosis, the marked rise in the visual sexual stimulation penogram indicates its value in determining psychotic impotence. In these 2 cases, however, mental function was found to be normal at the time of the test; sexual excitement occurred in response to visual sexual stimulation. In schizophrenia, and manic-depressive psychosis, especially in the depressive phase, sexual desire is said to disappear completely. Reaction to visual sexual stimulation is quite questionable in such cases, and therefore, Fujicapin loading penogram should be used in combination. Experiments indicate that sexual desire is a psychological phenomenon, rarely influenced by instinct and hormones. Sexual desire is still remained in aged men with marked androgen deficiency. Talbot (1955) found sexual desire even in cases of spinal cord injury with complete inability of erection and ejaculation. Consequently, except for patients with a limited number of diseases, there is some reaction to visual sexual stimulation.

The sensitivity to visual sexual stimulation, however, varies greatly in individuals. In some diseases, no sexual excitement was obtained in response to visual sexual stimulation, so that the Fujicapin loading penogram should be simultaneously carried out. The combined use of both tests would make the objective differentiation between organic and functional impotence more definite.

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References


