Cardiac Arrhythmias in Chronic Marijuana Smokers during Regional Anesthesia

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=국문초록=

만성 마리화나 흡연자에서의 국부마취중 심부정맥

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마리화나(Marijuana) 흡연이 심전도에 영향을 미친다는 보고가 있으나 그 정확한 기전은 알려져 있지 않다.

우리는 최근 많은 마리화나흡연자 마취중 4예에서 국부마취시행시 심전도에 이상소견을 경험하였다.

마리화나가 심장에 독작용이 있음이 입증되지 않았으나 마리화나흡연자 마취시에는 항상 주의하여야 하며 부정맥 발생에 대한 적절한 처치를 시행하여야 한다.

It has previously been suggested that marijuana use alters cardiac function^{3~6,8)}. We have recently encountered four chronic marijuana users who developed electrocardiogram (ECG) abnormalities during anesthesia and surgery.

MATERIALS AND METHODS

Case 1.

A twenty three year old black male underwent incision and drainage of a perirectal abscess under spinal anesthesia. The patient smoked marijuana for the past three years; otherwise, his past medical history was unremarkable. His physical examination revealed no abnormal findings. His preoperative chest x-ray, ECG and laboratory data were within

normal limits. Spinal anesthesia was induced with 1% tetracaine made hyperbaric with 10% dextrose. A T₁₂ anesthetic level was obtained. After induction of anesthesia and initiation of surgery, premature ventricular contractions (PVCs) appeared on the ECG monitor. This progressed to bigeminy, and shortly thereafter, to trigeminy (Fig. 1). The arrhythmia disappeared and normal sinus rhythm returned when 100 mg of 1% lidocaine was administered intravenously. Premature ventricular contractions recurred sporadically during the course of surgery. In the recovery room, the patient's ECG showed normal sinus rhythm with occasional PVC's (1-2/minute).

Case 2.

A twenty one year old black female under-

Fig. 1. ECG tracing reveals trigeminy occurring in a healthy patient under spinal anesthesia. Arrhythmia disappeared when 100 mg of 1% lidocaine was given.

Fig. 2. ECG shows AV dissociation. This pattern alternated with a nodal(AV) tachycardia. The AV dissociation resolved; the junctional tachycardia persisted.

went a cesarean section during continuous lumbar epidural anesthesia. Her past medical history, physical examination and preoperative laboratory data revealed no significant abnormality. The patient admitted to smoking

marijuana for the past five years. Epidural anesthesia was maintained at a T₆ level with 0.75% bupivacaine. Electrocardiogram monitoring revealed atrioventricular(AV) dissociation alternating with periods of junctional

Fig. 3. ECG reveals sinus arrhythmia with varying "R-R" interval. This progressed to a wandering pacemaker pattern.

Fig. 4. ECG shows sinus tachycardia alternating with an AV nodal tachycardia. Both arrhythmias disappeared spontaneously when surgery ended.

(nodal AV) tachycardia(Fig. 2). The AV dissociation appeared intermittently for brief periods, but the junctional tachycardia per-

sisted. An uneventful recovery occurred; the mother and child were discharged from the hospital within one week.

Case 3.

A twenty two year old Hispanic female underwent a repeat Cesarean section under continuous epidural anesthesia. She denied any significant past medical history but admitted to smoking marijuana for the past three years. A T₆ anesthetic level was obtained using 3% chloroprocaine, and was maintained with 0.75% bupivacaine. Surgery progressed uneventfully and twin boys were delivered. The intraoperative ECG initially revealed sinus tachycardia. After approximately ten minutes, the rate slowed and the tracing showed "P" waves of varying amplitude and configuration as well as irregular "R-R" intervals; apparently a sinus arrhythmia or a wandering pacemaker had intervened (Fig. 3). Normal sinus rhythm returned when the patient was in the recovery room.

Case 4.

A twenty two year old Hispanic male underwent excision of a benign breast mass under local anesthesia using lidocaine infiltration. The patient was sedated with intravenous diazepam (total of 10 mg) and meperidine (total of 80 mg). The patient's past medical history was significant for grand mal epilepsy for which he was treated with phenobarbital. There was no history of cardiovascular disease. He admitted to taking a wide variety of street drugs, including heroin, for several years. He also used marijuana for the past three years. His physical examination was normal except for bilateral gynecomastia. Laboratory studies, ECG and chest x-ray were within normal limits. Electrocardiogram monitoring during the procedure revealed sinus tachycardia alternating with AV nodal tachycardia (Fig. 4). Normal sinus

rhythm returned when the patient was in the recovery room. His postoperative course was uneventful.

DISCUSSION

Each of the patients presented here displayed cardiac arrhythmias while undergoing continuous ECG monitoring during surgery. Three cases were performed under regional anesthesia; the fourth, under local anesthesia with sedation. All four patients were chronic marijuana smokers having admitted to smoking marijuana daily or several times a week for several years. None had a previous history of cardiac disease.

Our observations revealed ECG changes suggestive of pacemaker (SA node) dysfunction and conduction abnormalities. These reports indicate that there may be an association between marijuana smoking and ECG abnormalities although no definitive cause-effect relationship can be determined. The incidence of cardiac arrhythmias in marijuana smokers is unknown, and arrhythmias in such a group can not be attributed to marijuana exclusively. In our group of patients, other variables such as the stress of surgery, the use of local anesthetics, and the cardiovascular changes characteristic of pregnancy and disease need to be considered.

Previous reports of changes in the heart's electrical conduction system resulting from marijuana ingestion have been inconsistent and inconclusive. Electrocardiogram changes ranging from alterations in "P" wave amplitude, "T" wave amplitude, ST segment patterns and QRS progression have been reported³⁻⁷. Premature ventricular contractions are occasional findings but marijuana has not been shown to increase the incidence of PVC's in young subjects^{3,7}.

Marijuana's active ingredient, Δ -9-tetrahydrocannabinol (Δ -9-THC) has a sympathomimetic effect on the heart, and induces a tachycardia that may last from 30 minutes to 12 hours^{2~4)}. Δ -9-THC-induced changes in cardiac rate have important implications for marijuana smokers who undergo surgery, especially those who have sustained recent trauma and/or blood loss. The sympathetic stimulus of Δ -9-THC and the stress of surgery may prove hazardous to the patient, especially to one who has coronary artery disease and increased myocardial oxygen demand. Our patients were young so we did not encounter his hazard; however, in cases where acute bleeding is a complication, the tachycardia caused by marijuana may interfere with the diagnosis of hypovolemia.

Further investigation is necessary to determine the effects of chronic marijuana use on cardiovascular function and electrical conduction in the heart, as well as the consequences of Δ -9-THC and anesthetic interaction. Caution is necessary when marijuana smokers present for anesthesia and surgery. Cardiac activity should be carefully monitored and appropriate drugs should be readily available for the treatment of arrhythmias.

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