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The Effect of Adenosine Triphosphate, Benidipine, Sugammadex, and their Combinations upon Cardiac Damage after Temporary Clamping of the Abdominal Aorta in Rats

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SUMMARY. **The aim of our study was to biochemically and histopathologically investigate the protective effect of adenosine triphosphate (ATP), benidipine, sugammadex and (ATP + benidipine + sugammadex) ABS against cardiac damage induced by abdominal clamping and unclamping (ACU) procedure in rats. Rats utilized were divided into six groups as Healthy (HG), Abdominal ACU (AACC), ATP + AACU (ATPG), Benidipine + AACU (BNDG), Sugammadex + AACU (SDXG), ABS + AACU (ABSG). One hour before anesthesia, ATP (25 mg/kg; ip) was administered to the ATPG group, Benidipine (4 mg/kg orally) was administered to the BNDG group, Sugammadex (4 mg/kg ip) was administered to the SDXG and ABS was administered with this specified dose and method to the ABSG group. Distilled water as a solvent was injected to AACC and HG groups. One hour after, laparotomy was performed to the rats, and the abdominal cavity was reached. Ischemia was provided for one hour and then reperfusion for 2 h placing an atraumatic clamp on the suprarenal abdominal aorta of the animals in all groups (except from the HG). The heart tissues extracted from the killed animals were examined biochemically and histopathologically. ATP and benidipine suppressed the increase of oxidant and proinflammatory cytokines better than sugammadex. The ABSG group was found to be almost the same as the healthy group biochemically and histopathologically ($p > 0.05$). ABS drug form alone was possible to be much more beneficial rather than ATP, benidipine and sugammedex in the treatment of cardiac damage induced by AACU procedure.**

RESUMEN. El objetivo de nuestro estudio fue investigar bioquímica e histopatológicamente el efecto protector del trifosfato de adenosina (ATP), benidipina, sugammadex y ABS (ATP + benidipina + sugammadex) contra el daño cardíaco inducido por el procedimiento de pinzamiento y desbloqueo abdominal (ACU) en ratas. Las ratas utilizadas se dividieron en seis grupos como Sanos (HG), ACU abdominal (AACC), ATP + AACU (ATPG), Benidipina + AACU (BNDG), Sugammadex + AACU (SDXG), ABS + AACU (ABSG). Una hora antes de la anestesia, se administró ATP (25 mg/kg; ip) al grupo ATPG, Benidipina (4 mg/kg por vía oral) al grupo BNDG, Sugammadex (4 mg/kg ip) al SDXG y Se administró ABS con esta dosis y método especificados al grupo ABSG. Se inyectó agua destilada como solvente a los grupos AACC y HG. Una hora después, se realizó laparotomía a las ratas y se llegó a la cavidad abdominal. Se proporcionó isquemia durante una hora y luego reperfusión durante 2 h colocando una pinza atraumática en la aorta abdominal suprarrenal de los animales en todos los grupos (excepto del HG). Los tejidos cardíacos extraídos de los animales sacrificados se examinaron bioquímica e histopatológicamente. ATP y benidipina suprimieron el aumento de citocinas oxidantes y proinflamatorias mejor que sugammadex. Se encontró que el grupo ABSG era casi igual que el grupo sano desde el punto de vista bioquímico e histopatológico ($p > 0,05$). La forma de fármaco ABS sola pudo ser mucho más beneficiosa que ATP, benidipina y sugammedex en el tratamiento del daño cardíaco inducido por el procedimiento AACU.

KEY WORDS: abdominal aorta, adenosine triphosphate, benedipine, cross-clamping, sugammadex, rat.

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