Effect of ciprofloxacin on the articular cartilage in albino mice

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Abstract

The present study was conducted to clarify the histological effect of ciprofloxacin, on albino mice articular cartilage. The study conducted 30 neonate mice divided into 3 groups, 2 groups were administrated using 100 and 500 mg\kg B.W.\day for 30 days oral dose of ciprofloxacin. The last group was the control. After that the joint were fixed for histological studies. Histological changes were observed in the joints chondrocyte loss, matrix degeneration, and erosion of the articular cartilage.

تأثير السبروفلوكساسين على الغضاريف المفصلية في الفئران البيضاء

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المستخلص

تضمنت الدراسة الحالية تقييم التاثير النسيجي للسبروفلوكساسين في غضاريف المفصل لصغار الفئران البيضاء استخدمت جرعتين 100و500 ملغم\كغم\وزن جسم . لمدة 15 يوما من يوم الولادة ، تم تقسيم 30 فارة إلى ثلاث مجاميع ،مجموعتين جرعت بجرعتين مختلفة من الدواء عن طريق التجريع ، والمجموعة الأخرى مجموعة تحكم . أوضحت التغيرات النسيجية حصول تأكل وتحطم في غضاريف المفصل و انحلال النوية داخل خلايا الغضروفية.

Introduction

Flouroquinolones antimicrobial agent is widely used in clinical practice as broad- spectrum antimicrobial with excellent bioavailability. They inhibit the replication of bacterial DNA by interfering with the action of DNAgyrase during bacterial growth and reproduction[1]. These compound have been reported to induce adverse effects on the musculoskeletal system[2]. Fluorquinolones have been associated with artheropathy in weight bearing joints. Studies have shown erosion and permanent lesions of cartilage due to quinolones administration in animals[3,4]. Because of this observation , fluroquinolones have not been recommended for use in children. FQs particularly those introduced into clinical practice in the last decade, have been used widely and effectively to treat adults with serious bacterial infections caused by multidrug-resistant bacteria. As these infections have become more important in children,It is apparent that the risk benefit analysis for using fluoroquinolones in children with these infections must be defined better. [5]ciprofloxacin is related to the 2nd generation of flouroquinolones group of antimicrobial, it was discovered at the end 1982 by (Bayer). It has a strong antibacterial action against a broad spectrum of bacteria transcription [6]. The aim of this study was to investigate the histological alternative changes in joint neonate mice as result of ciprofloxacin administration.

Material and methods

Animals and experimental design. Neonate mice,. Animals were housed five per cage under controlled conditions of temperature (22C°) and light 12h light, 12hdark cycle).they received standard diet and water. ciprofloxacin was dissolved in distilled water. The mice were divided into three groups (n- 30) , the first group was considered as control and received only distilled water, while the other group received 100mg, 500mg of the drug respectively by gavages for (30)days. ciprofloxacin administration from (1-30) days after birth.

Histological studies

The day after the final administration, all animals were weighed and killed by exsanguinations under chloroform anesthesia , and the joints were weighed then prepared for histological examination.The joints fixed in a formalin fixative (10% formalin with 90% distilled water), for at least 24 hours. The fixed joints were dehydrated in ascending series of alcohol, cleared in xylene and embedded in paraffin and consecutive section (5-8)µm thick were obtained by a rotary microtome(Erma) , and stained with (H&E) Harris Haematoxylin and Eosin[7].

Result and discussion

Joint section was normal in control group Fig(1)(a,b). However , after 500mg ciprofloxacin treatment of the second group, Fig (3),(a,b), shows chondrocyte loss, matrix degeneration, and erosion of the articular cartilage. The articular is eroded and diminished at the lateral margin, many of the chondrocytes an with out nuclei,nuclei of other chondrocytes are small, part of the sheet of cartilage has been invaded and destroyed, matrix between the chondrocytes has lost. Group after treated with 100mg was less affected than the second group Fig (2)(a,b) .Histological examination indicated that ciprofloxacin treatment damage cartilage in certain areas of the joint.

similar results were reported by Linseman at al [8] who studied the effects of ciprofloxacin on the weight – beaming joint in the neonatal mouse, they suggest that neonatal mice are sensitive to quinlone-induce artheopathy. Studies of animal's reproduction support this study, they found In young beagles 100mg| kg ciprofloxacin given daily for 4 weeks, caused articular degenerative changes of knee joint. at 30mg\kg the effect on the joint was minimal[9]. The qunolones have a high affinity for cartilage. Studies with beagle dogs and guinea pigs have demonstrated arthropathy of weight –bearing joints after administration of 200- 1000 mg 0f pipemidic and oxolonic acid ,respectively[10].the previous dose occurs because high doses of ciprofloxacin were used to compare with the safe dose. This could be explained by elevation of serum fluoride levels followed by fluoride poisoning[11]. Intake of more than 6mg fluoride |day results in fluorosis, symptoms which include weight lost, brittleness of bones, anemia, weakness, and joint stiffness[12].flouroquinolone induced oxidative stress which lead to exhibit tendon toxicity[13].

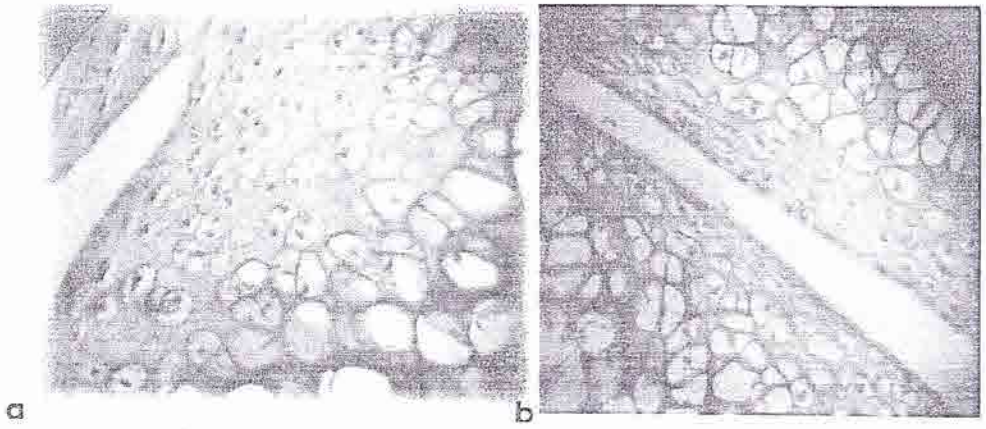

Fig (1):- (a,b) section from control neonate mice(X40,H&E)

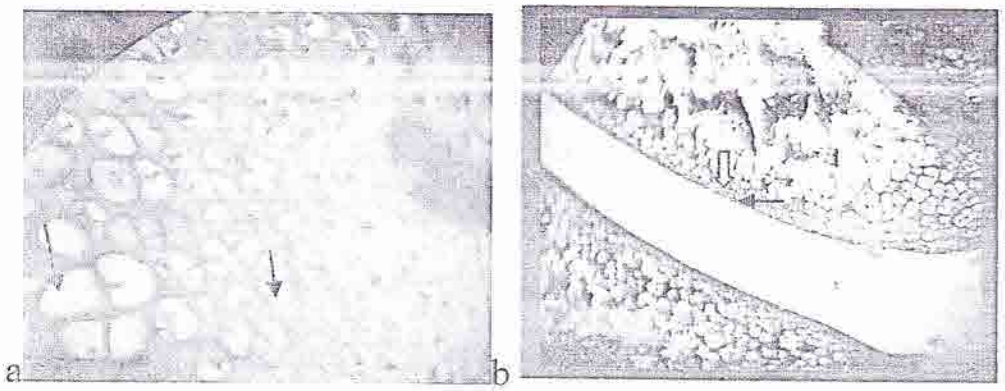

Fig (2):-(a,b): section from treated neonate mice showing loss of nuclei from chondrocyte necrosis, brightness of treated neonate mice with 100mg of ciprofloxacin(X40,H&E).

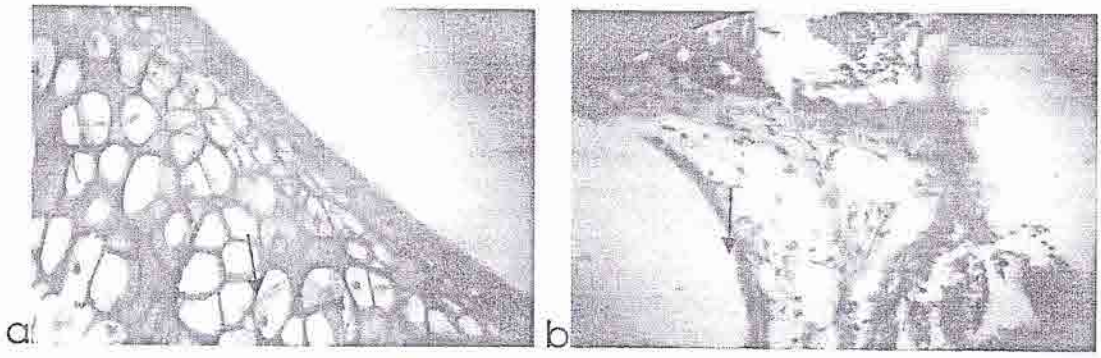

Fig:-(3):-(a,b) neonate mice treated with 500mg clarify erosion and degeneration of cartilage matrix and chondrocyte and nuclei loss.(X40,H&E).

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