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رئيس القسم : أ.د/ حمدي سالم

تغيرات أمعاء وطحال الفئران في حالة صدمة النيتروكسين الحادة والمزمنة

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تم فحص الأمعاء والطحال لعدد ٤٠ فأر أبيض بالمجهر الضوئي بعد تعريضهم للصدمة الحادة والمزمنة بالنيروتوكسين • لوحظ أن الأمعاء في المرحلة الحادة تميزت باحتقان الأوعية الدموية ورشح بين خلوي بينما في المرحلة المزمنة تميزت بتفاعل خلوي وزيادة في النسيج الضام • أما الطحال في المرحلة المزمنة تميزت بزيادة الخلايا الليمفاوية والميجاكريوسيت مقارنتة بمجموعة المقارنة •

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INTESTINAL AND SPLENIC CHANGES IN ACUTE AND PROTRACTED NEUROTOXIN SHOCK IN RATS

(With 7 Figs.)

By
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(Received at 18/4/1987)

SUMMARY

Fourty intestine and spleen of rats were examined microscopically following acute and protracted neurotoxin shock. In acute phase congestion and oedema were prominent, while in protracted phase, cellular reaction in the villus cores with marked increase of connective tissue was observed. Increase in the number of megakaryocytes and lymphocytic population in the spleen belonging to prolonged shock were noticed.

INTRODUCTION

Colitoxin induces shock in swines through disturbance in the permeability of the blood vessels (SCHULZ, 1961). Similar disturbance in the vascular permeability was induced by neurotoxin, was found by SCHIMMELPHENING (1970).

Severe congestion of the visceral organs, haemorrhages, microthrombosis and oedema were the main pathological findings in acute shock phase (NIELSEN and CLUGSTON, 1971; BUROW, 1975; MANOHAR, et al. 1975 and DROMMER, et al. 1982). Following the acute shock phase in surviving animals or man (Protrocted shock) a variable pathological changes in the Lung, Kidney, adrenal and Liver were described by MITTERMAYER, et al. (1978) DROMMER (1979) RIEDE (1981) and DROMMER, et al. (1982, 1983).

Intestine was considered as the main target organ in different types of acute shock MANOHAR, et al. (1975). It is interesting to study the reaction of the intestine and the spleen in prolonged neurotoxin shock using rats as a experimental animal.

MATERIAL and METHODS

Animals:

Fifty four pathogen-free rats with body weight ranging from 140-240gm were used. All rats were kept individually in separate cages and maintained on standared commercial rat pellets. Fourteen rats were considered as control animals. While the remaining rats -(40) constituted the shock group.

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Toxin:

Neurotoxin (NT) was prepared from E. Coli, strain E.B. 170 serotype O 139: k 82 (B) and kindly provided by prof. Dr. Schimmelpfenning (Institute of Vet. Med. University of Cüttingen West Germany).

Methods:

All rats were weighted before the experiment. In shock rat group 0.10 ml 20 LD 50 mouse diluted in physiological saline 1:10 and injected in the tail vein according to the weight of the rat. At the same time the control rats received the same volume but of physiological saline only.

The rats which died within 24 hours from the first injection were considered as acute shoch group (6 rats). In order to creat a prolonged shock reaction, the surviving animals were given 2-4 injections in intervals of 1-3 weeks (8 rats 2 injections, 6 rats 3 injections and 20 rat 4 injections).

Specimens from the intestine and spleen of all rats were taken and fixed in 5% glutaraldehyd and processed for light microscope. hematoxylin and eosin, Masson trichrome stain, PAS reaction and Azur stain were applied.

RESULTS

Clinical symptoms:

Increased respiratory rate, roughness of the hair, cyanosis of the tail and limbs and apathetic appeared 20 minutes after injection and stayed 3 days. 6 out of 40 shock rats died 19-24 hours after the first injection (acute shock rats). After the second, third and fourth injections Similar but mild clinical symptoms were noticed. Two rats died after the second injection and 6 rats were sacrificed. Also two rats died after the third injection and 4 rats sacrificed. No deaths were observed following the fourth injection.

Macroscopical findings:

Dead rats in acute shock phase and in protracted shock' were showing severe congestion of the intestine; liver, kidney, spleen and lungs. In sacrificed rats no gross lesions could be noticed except thickening of the intestinal wall in comparison with the controle rats.

Microscopical findings:

Intestine of dead rats in acute shock phase were showing vascular and degenerative changes. Mucosal and submucosal blood vessels showed severe congestion. Also microthrombosis was prominent in the small blood vessels with marked oedema of the villus cores. Epithelial covering of the villi were showing degeneration with focal areas of necrosis.

One to two weeks from the begining of the experiment, beside oedema of the connective tissue core, mononuclear cellular reaction was observed in comparison with the control intestine (Fig. 1 and 2). The cellular reaction increased markedly after two or more injections. In addetion hyperactivity of the mucin producing cells was seen (Fig. 3 and 4). These mononuclear cells were mostly undifferentiated mesenchymal cells and lymphoid cells. The covering epithelium of the villi showed focal hyperplastic changes.

With the increasing duration of the prolonged shock (3 weeks) and after three or more neurotoxin injections, the cellular reaction could be differentiated into fibrocytes and lymphocytes. Four to eight weeks from the begining of the experiment a marked collagenus connective tissue was formed in the villus cores (Fig. 5).

Spleen:

The spleen of dead rats in acute shock phase showed severe congestion of the red pulp and depletion of the lymphocytic cell pobulation in the white pulp (Fig. 6). In protracted shock phase a marked increase in lymphocytic cellular population of both red and white pulp could be noticed. In comparison with the control rats a sharp increase of the megakaryocytes in the spleen could be noticed (Fig. 7). The increase in the number of megakaryocytes was found mainly in the spleen of rats which were sacrificed (1-4 days) after NT. injections.

DISCUSSION

Intestinal congestion, microthrombosis, and oedema were the disturbances observed in acute shock phase. Focal areas of epithelial necrosis could be also observed. In different animal spieces semilar circulatory disturbances were mentioned by SCHULZ (1961), NIELSEN and CLUGSTON (1971) FRITSCH, et al. (1972); BUROW (1975) and MANOHAR, et al. (1975). The epithelial necrosis noticed in our results could be attributed to the observed circulatory disturbances.

In prolonged shock phase, following the second third and fourth NT injections, the intestinal response began by cellular reaction following the oedema which was observed in acute phase. With increased duration, most of these cells could be differentiated in to fibrocytes with prominent C.T. Fibres. Those findings were in agremeant with those discribed in different argans such as Liver, Kidney, Lung and adrenal gland by MITTERMAYER, et al. (1978). DROMMER (1979). ROSENBRUCH (1979). RIEDE (1981) and DROMMER, et al. (1982, 1983).

The increased lymphocytic cellular population in intestine and spleen which was observed in our results seemed to be an immune response against the neurotoxin.

During the shock phase after injection of endotoxin aggregation to the blood platlets forming microthrombi or emboli was the constant Finding (BUROW, 1975; MCCLURE, 1976; GOODMAN, et al. 1979 and DROMMER, 1979). Appearance of large number of megakaryocytes in the spleen in protracted shock seemed to be a compansatory state following destruction of large number of blood platlets in acute phase of shock.

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DISCRIPTION OF FIGURES

Fig. (1): Intestine of control rat H.E. stain Mag (10x12.5).

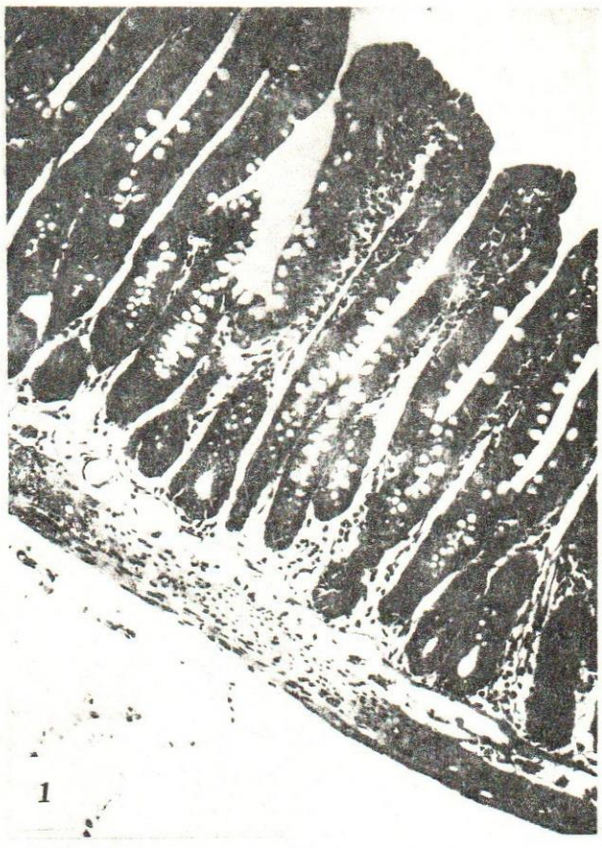
Fig. (2): Intestine after two N.T. injection showing cellular reaction and oedema H.E. stain Mag (10x12.5).

Fig. (3&4): Intestinal mucosa showing marked cellular reaction and thickening of the villi H.E. Stain, Mag (10x12.5).

Fig. (5): Six weeks duration and after four injections, the intestinal villi showing thickening and fibrosis H.E. Stain Mag (10x12.5).

Fig. (6): Spleen showing congestion and depletion of lymphocytic population H.E. stain Mag (10x12.5).

Fig. (7): Marked increase of Megakaryocyte in spleen belonging to protracted shock group H.E. stain Mag (25x12.5).



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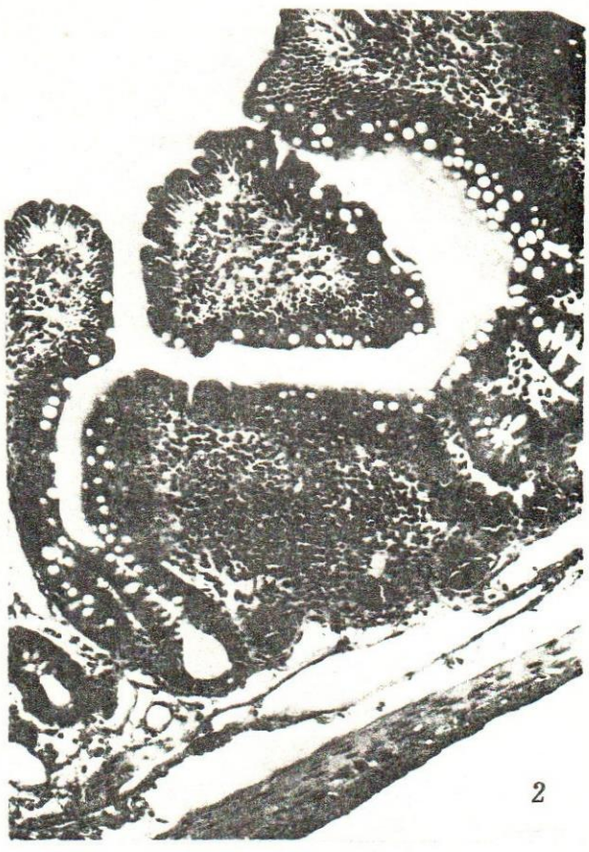

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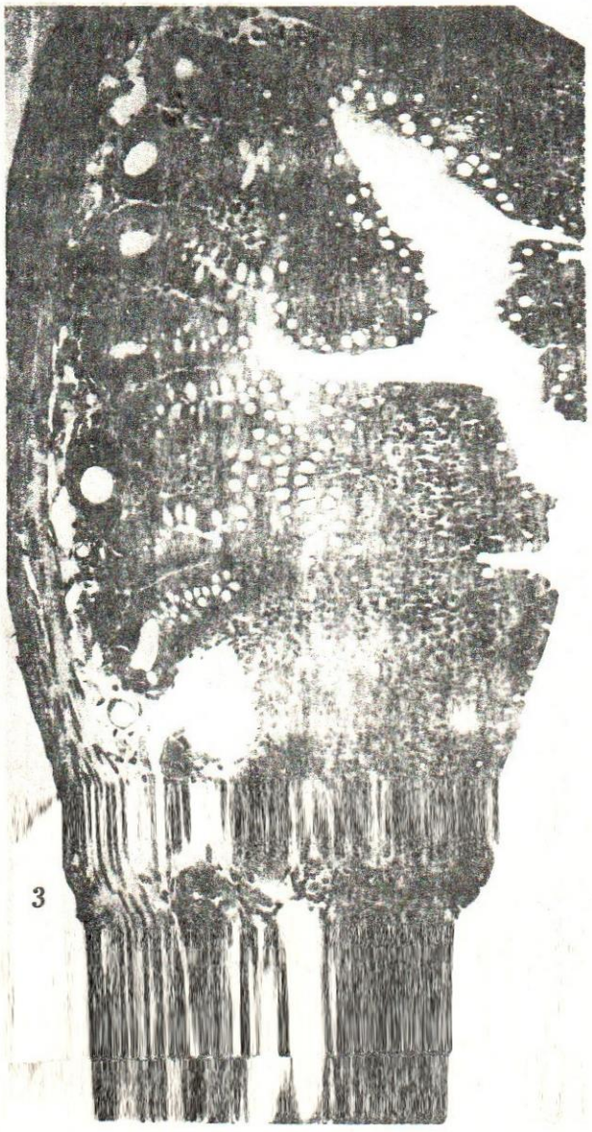

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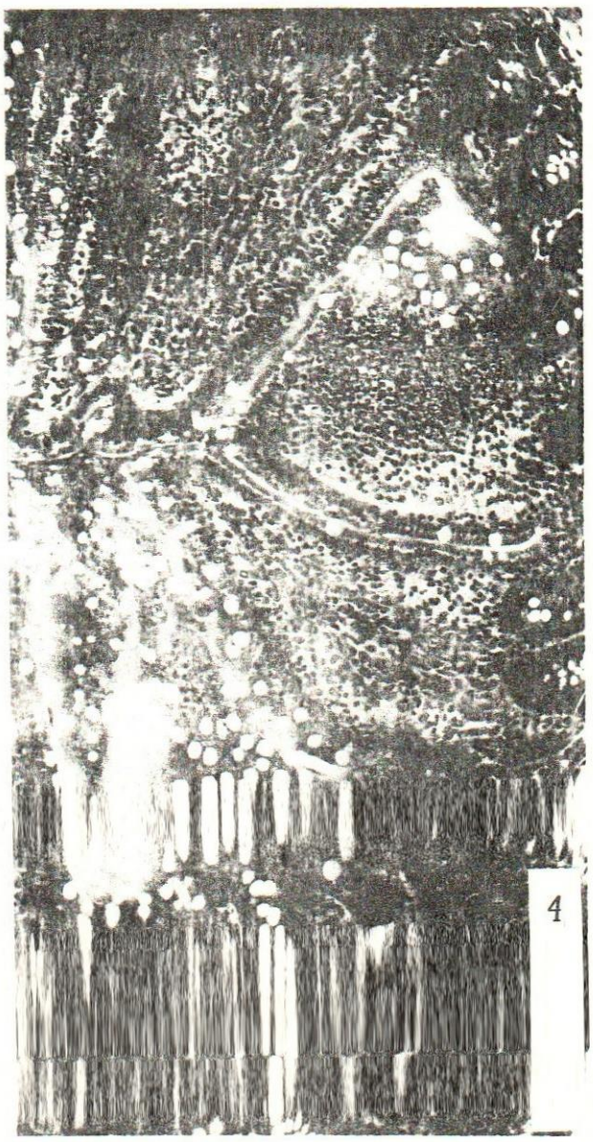

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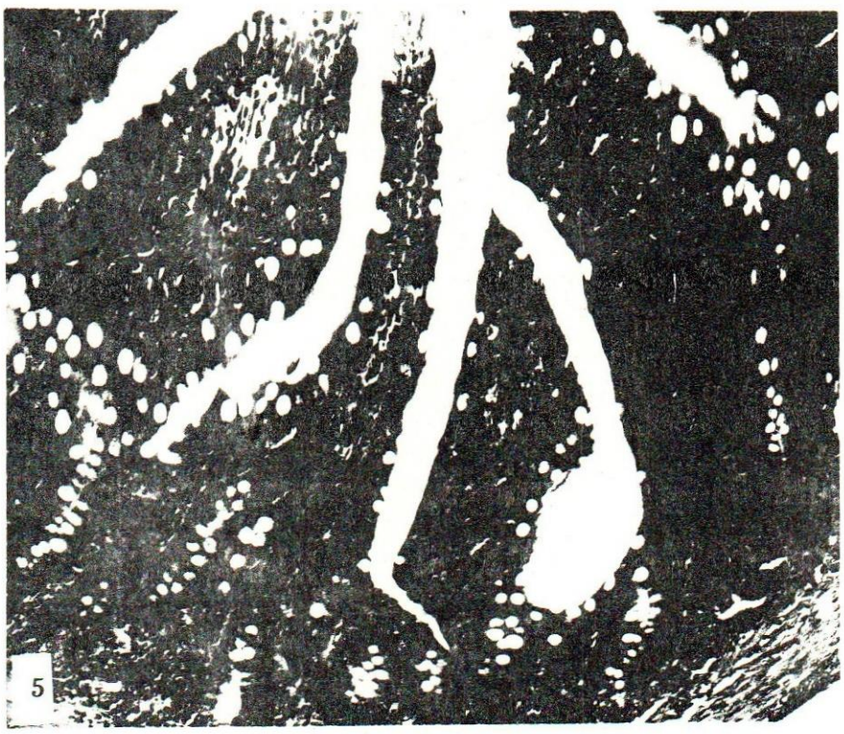

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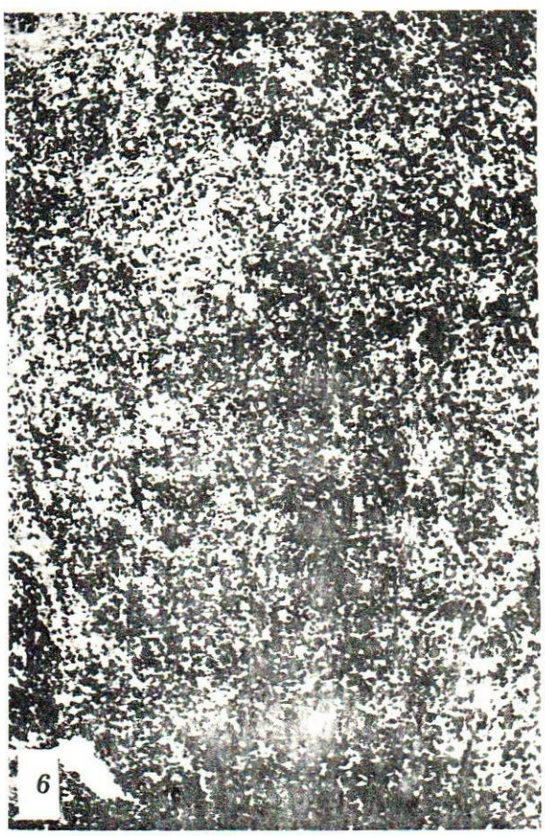

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