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Inguinal Herniation : A Disease of Collagen

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Abstract

In a trial to assess the role of biochemical failure in the formation of inguinal hernia, 60 patients with inguinal hernia (30 de novo cases, 10 patients with hernia on one side and a previous repair on the other and 20 with recurrent hernia), and 20 controls were studied. Hydroxyproline content were determined in the anterior rectus sheath of the patients and the controls. The results showed a low level of hydroxyproline content in all hernia groups studied compared to the control and the difference was significant statistically. Surgeons should give the biological factors of hernia formation the same importance that given to the mechanical one. This may change their concepts of the management of hernia and may decrease the incidence of recurrence.

Introduction

AETIOLOGY of inguinal herniation still remains a matter of debate. Many well known factors have been incriminated in the process of herniation, however looking to this condition at the biochemical level deserves special attention. Collagen, elastin glycoproteins, protein polysaccharides and hydroxyproline form the biochemical make up of the connective tissue. Collagen constitutes 50% of the total proteins in the body. It is the principal solid substance in white fibrous tissue. Hydroxyproline and its precursor proline enter in the formation of collagen and hydroxyproline appears to stabilize the collagen.

Determination of hydroxyproline in various tissues and cells has been used to measure the amount of collagen in such tissues and cells as in transversalis fascia and rectus sheath. In the present work, we are aiming to study the role of hydroxyproline as a factor in occurrence and recurrence of inguinal hernia.

Material and Methods

This study was performed on eighty patients, sixty of them presented with inguinal herniation without age or sex predilection. Thirty patients had de novo inguinal herniation on one side and ten patients had inguinal hernia on one side

with previous repair on the other side. The last twenty patients had recurrent inguinal hernias. Twenty patients who had no hernias were used as control. A piece of tissue (one × one cm), with an average weight 0.2 gm had been removed from the nearby part of the rectus sheath of the studied cases. Hydroxyproline content of the specimens was estimated by the method

of Berg[1]. The specimens of the control group were taken during lower abdominal surgical procedures performed for the patients for different reasons.

Results

Results are shown in Tables 1-2 & Fig. 1.

Table (1) : Range and Mean of Age and Hydroxyproline Content of the Studied Groups.

Type of hernia	No.	Age (Y)		Hydroxyproline (ng/gm)	
		range	mean	range	mean
De novo cases	30	17 - 49	30	316 - 348	334.5
Reccurent cases	20	47 - 68	57	266 - 307	284.2
Previous repair on other side	10	33 - 48	41	307 - 317	313.1
Control group	20	36 - 59	39	290 - 440	394.1

Table (2) : Statistical Evaluation of the Different Groups.

Groups compared	P value	Significance
Recurrent Vs Controy	< 0.001	Highly sig.
De novo Vs Control	< 0.005	Highly sig.
Other side Vs Control	< 0.005	Highly sig.

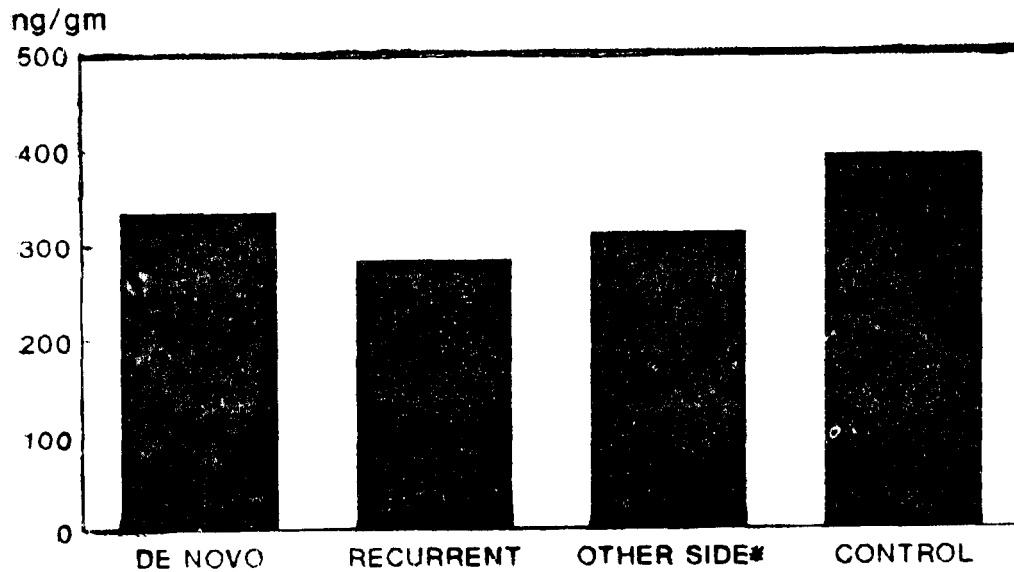
Discussion

The earliest record of inguinal hernia dates back to approximately 1500 B.C., it was metioned in he Egyptian papyrus and also the ancient Greeks were well aware of it. Much controversy surrounds the question of the cause of inguinal hernias. A patent processus vaginalis is held to be

the prime cause of indirect inguinal hernia. yet almost other mammals have a permanently patent processus vaginalis and only very rarely suffer from inguinal hernia. At post mortem examination many adults have a patent processus vaginalis, yet they did not have a hernia during life. Peacock suggested in 1978[2] that abnormalities

in the structure of collagen such as a reduction in polymerized collagen and a decreased concentration of hydroxyproline will lead to a loss of binding between the collagen fibers. This mechanism is important especially in cases of repeated recurrent hernia and perhaps in cases of familial tendency to hernia.

Fig. 1. Mean hydroxyproline content in different groups.



* Hernia on a side and previous repair on the other.

Attenuation of the rectus sheath and presenile atrophy were identified as a cause of onset and recurrence of inguinal herniation by Reed in 1970[3]. Conner and Peacock[4] succeeded to produce hernia in rats through the induction of a metabolic defect in cross linkage of collagen by feeding the rats with a lathyrogenic diet and then inflicting an injury to the internal ring. Rats have a peritoneum-lined sac extending to the scrotum and a deposit of fat plugging the opening of this sac and this prevents hernia formation. Altered connective tissue metabolism following the administration of a lathyro-

genic agent such as Beta amino propionitrile (BAPN) prevents cross-linkage in newly synthesized collagen, resulting in a more soluble form with decreased tensile strength.

Recurrence of the indirect inguinal hernia is claimed to be due to failure to ligate the neck of the sac accurately. However the length of time required for a recurrent hernia to develop in some patients suggests that an inadequately ligated sac is not responsible for all recurrences. The peritoneum is primarily dense connective tissue which could be affected by a generalized defect of collagen metabolism.

The development of a new sac may be due to structural changes in the connective tissue of the peritoneum[5].

In 1974, Wagh and his colleagues[6] identified an ultrastructure abnormality in the hydroxyproline content and also altered hydroxyproline : proline ratio in direct inguinal hernia in men. Also fascia transversalis in the groin area of patients with inguinal hernia can incorporate C14 proline and convert it to C14 hydroxyproline at an accelerated rate than that of fascia lata. Direct measures showed active collagenolysis[2].

In Kasr El-Aini Hospital, Massoud et al[7] found low levels of tissue collagen in 32 inguinal hernia patients in comparison to controls. We tried in this work to confirm their finding and also we studied recurrent cases and patients who underwent herniorrhaphy on one side and presented with a hernia on the other side. The collagen content of the obtained samples from the different studied groups was lower than that of the control group. The difference was statistically highly significant (Table 2).

The recurrence recorded in hernia repair in different centers is 10%, despite the different methods of repair[8]. This rate of recurrence may not be related to the method of repair or the suture material used but it may be due to an inherent defect in the patient himself. The new trend of using prothesis in hernia repair either laparoscopically or surgically with a low recurrence (0.25%)[9] and also the use of dermal collaien implants for hernia repair[7] will support the bio-

chemical abnormality as an important factor in hernia formation. Further research in this field can give a new aetiological concept with a new look at treatment.

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