

Role of Hypoproteinaemia in Abdominal Wound Dehiscence

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Summary

A total number of 1026 cases were operated per abdomen as either elective or emergency cases during 1997-1998, of which 60 had developed dehiscence giving an incidence of 5.85%. Hundred cases were studied and were divided into 2 groups. Dehiscent group comprised of 60 patients having wound dehiscence. Non-dehiscent group or control group comprised of 40 patients having clean and healthy wound. Hypoproteinemia was found to be an important factor in causing wound dehiscence and it co-existed with anaemia and was more common in rural patients because of poor nutritional reserve. Cases operated as an emergency admission, showed low level of serum protein affecting the inherent strength of injured tissue and wound dehiscence of varying degree was the postoperative complication. Hypoproteinemia was mainly due to low levels of albumin and it favoured wound infection and dehiscence.

Introduction

During the course of his existence, man in common with other living creatures, is subjected to frequent injuries. Disruption of abdominal wound either by the surgeon's knife or by accidental injury continues to be a distressing complication of abdominal surgery. Almost every surgeon who has been in practice for any length of time has had to deal with this catastrophe. In spite of improved preoperative and postoperative care, the use of antibiotics and new types of suture material, the incidence of this complication has remained static. Wound dehiscence may be partial or complete. Hypoproteinemia is one of the important factors in causing wound dehiscence; the others being anaemia, wound infection, age, diabetes, corticosteroid therapy, type of incision, coughing, vomiting etc. Protein is the principle building constituent and is required in the formation of fibroblasts. Feeding on high protein diet increases the velocity of the growth of fibroblast and

increases the role of cellular proliferation and the tensile strength of wound. Protein deficiency interferes with the epithelialization of wound. Catgut loses the tensile strength more rapidly in tissues in the presence of hypoalbuminaemia. Hypoproteinaemia is related to increased chances of wound infection.

Material and methods

The present study was conducted in the department of Obstetrics and Gynaecology, B.R.D. Medical College, Gorakhpur during the period of 1997 to 1998. Out of the 1026 cases operated either as an emergency or an elective basis in obstetrical and gynaecological wards, hundred cases were selected for study purpose and were divided into two groups.

1. Dehiscent group, comprised of 60 patients having wound dehiscence of varying degree.
2. Non-dehiscent or control group comprised of 40 patients having clean and healthy wound.

Every case was screened on the basis of a detailed history, examination, diagnosis and routine investigation, operation done, postoperative complications, mechanical and stress factors and cortisone therapy prior to or during operation. Condition of wound on removal of sutures was noted. Laboratory investigations included routine examination of blood, urine, stool, blood sugar and swab culture from the wound. Special biochemical tests- total serum protein, serum albumin, globulin and A/G ratio were determined by Buret method. In the elective group, investigations were done preoperatively while in most of the emergency obstetric cases which were performed at odd hours had their investigations done postoperatively.

Observations and Discussion:

In our study, the overall incidence of wound dehiscence in gynaecological and obstetrical operation was 5.85%. Incidence of wound dehiscence was higher in obstetrical operations (6.11%) in comparison to gynaecological operations (3.64%) (Table I). Our findings were consistent with those of Marsh (1954) who reported the incidence to be 5.8%. Raman and Mukherjee (1993) found it to be 7.97%. They also found higher incidence of wound dehiscence in obstetrical operations than in gynaecological operations because most of the cases belonged to the obstetrical category who were registered very late in labour while others reported lower incidence of wound dehiscence viz. 0.27% by Notelowitz and Crichton (1967), 2.3% by Mowat and Bonnar (1971) and 0.3 to 3% by Le-Inde (1977). The wide variation in the range of incidence was owing to the fact that in our study all degree of wound gaping, partial or complete, were included. In dehiscent group 93.33% had emergency operations while in non-dehiscent group 80% had elective operations (Table II). The mean albumin level was significantly lower in emergency group in comparison to elective group (p<0.05) (Table II), because most of the obstetrical emergency cases reported late in labour with premature rupture of membranes, prolonged or obstructed labour, rupture of uterus and were from rural areas having low socioeconomic status and were associated with anaemia, malnutrition, infections which cause increase in wound dehiscence rate. Our findings were similar to those of Raman and Mukherjee (1993).

Table-I
Showing the Incidence of Wound Dehiscence

Category	No. of abdominal operation	No. of cases dehiscence	Incidence in percentage
Obstetrical	96	56	06.11
Gynaecological	110	04	03.64
Total	1026	60	05.85

Table-II
Showing Serum Albumin Values in 2 Groups with the nature of Operation

Nature of Operation	Dehiscent group (60)		Non-dehiscent group	
	No.	%	Mean albumin (gm%)	Mean albumin (gm%)
Emergency	56	93.33	2.56 ± 0.36	3.8 ± 1.1
Elective	04	06.67	2.68 ± 0.058	4.0 ± 1.27
Dehiscent group	z=2.14		Non-dehiscent group z=2.14	
	P<0.05		p<0.05	
	Significant		Significant	

All the mean values i.e. mean total serum protein, mean albumin and mean A/G ratio were significantly lower in dehiscent group in comparison to those in non-dehiscent group except for mean serum globulin which was higher in dehiscent group in comparison to non-dehiscent group (Table-III) because of easy and repeated exposures to the infection causing a rise in gamma globulin. Raman and Mukherjee (1993) reported similar findings. The lower total protein was mainly due to low level of serum albumin.

Table III
Comparative Serum Protein Values in Dehiscent and Non Dehiscent Group

Groups	Mean serum protein (gm%)	Mean serum albumin (gm%)	Mean serum globulin (gm%)	Mean A/G ratio
Dehiscent	5.32 ± 0.679	2.62 ± 0.679	2.70 ± 1.17	0.99 ± 1.21
Non-dehiscent	6.5 ± 0.256	3.9 ± 0.256	2.6 ± 1.23	1.52 ± 1.03
Z value	12.24	13.28	1.89	10.31
P value	< 0.001	< 0.001	> 0.05	< 0.001
	Most highly significant	Most highly significant	Not significant	Most highly significant

Hypoproteinaemia was considered when the serum albumin level was below 3.5 gm% and 85% of dehiscent cases had hypoproteinaemia in comparison to 25% in the non-dehiscent group (Table-IV). Our findings were similar to those of Koster and Shapiro (1940) who found that 86% of cases of wound dehiscence had serum albumin below 3.75 gm%. Alexander and Prudden (1966) had albumin values of less than 3 gm% in 53% cases of wound dehiscence. Raman and Mukherjee (1993) found 72.5% of dehiscent cases had serum albumin below 3.5 gm%.

Table IV
Distribution of cases according to serum albumin value in two groups

Serum albumin value (gm%)	Dehiscent group		Non-dehiscent group	
	No.	%	No.	%
Below 3.5	51	85.00	10	25.00
3.5-4.5	08	13.33	26	65.00
Above 4.5	01	01.67	04	10.00

Table-V shows that 91.67% of the cases of dehiscence group had haemoglobin level below 7gm or between 7 & 10 gm%, while in non-dehiscence group 62.5% of the cases had haemoglobin level above 10 gm%. The serum albumin values were significantly lower in the dehiscence group in comparison to non-dehiscence group ($p < 0.001$) (Table-V). Lower the haemoglobin percentage or greater the degree of anaemia lower will be the serum albumin values ($p < 0.001$). Raman and Mukherjee (1993) & Wolff (1950) also had similar findings.

Conclusion

From the present study it can be concluded that hypoproteinaemia is one of the important factor in the causation of wound dehiscence. Protein increases the velocity of growth of fibroblast and cellular activity in the healing of wound. Protein deficiency interferences with the epithelialization of wound. Low level of serum albumin is one of the main factors in the causation of wound dehiscence.

Table V
Degree of Anaemia and serum protein levels in the dehiscence and non-dehiscence groups

Degree of Anaemia (Hb in gm%)	Dehiscence group			Non-dehiscence group		
	No.	%	Mean albumin (gm%)	No.	%	Mean albumin (gm%)
Below 7	13	21.67	2.60 ± 0.07	02	05.00	3.4 + 0.1
7-10	42	70.00	2.44 ± 0.16	13	32.50	3.8 + 0.18
Above 10	05	08.33	2.77 ± 0.15	25	62.50	4.0 + 0.278
Hb in gm%	t value		p value			
Below 7	13.14		< 0.001			Most highly significant
7-10	25.52		< 0.001			Most highly significant
Above 10	09.29		< 0.001			Most highly significant

In our study we found that all the mean values i.e. total serum protein, albumin and A/G ratio in dehiscence group having wound infection were significantly lower ($p < 0.001$) than those in dehiscence group without wound infection except for mean serum globulin which was higher in dehiscence group with wound infection. Our findings were similar to those of Koster and Shapiro (1940), Cannon et al (1944), Schiebel and Creech (1953) and Subramanian et al (1973) who found that wound infection is common in hypoproteinaemic patients leading to increased incidence of wound dehiscence. Age, parity, socioeconomic status, mechanical and stress factors also contributed towards wound gaping.

The average duration of hospital stay in dehiscence group was 20-30 days while in non-dehiscence group it was only 8-10 days. In our study mortality rate was 1.7% even in complete dehiscence while Raman and Mukherjee (1993) reported 2.3%, Mann (1962) 18-20% and Te-Linde (1977) 15% mortality.

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