

Case Report

Delayed Detected Unexpected Complication of ADCON-L® Gel in Lumbar Surgery

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The ADCON-L gel® (Gliatech, Cleveland, OH, USA), a carbohydrate polymer gel, has been shown in a controlled clinical study to inhibit postsurgical adhesions and improve a patient's clinical outcome. Immediate complication of this gel has been reported in the recent literature including back pain, radiculitis and durotomy. However, delayed detection of disturbance of muscle healing and attachment in late postoperative state has been rarely reported. This report documents an unexpected delayed detected complication of the anti-adhesion barrier gel, which was used after lumbar discectomy one year ago, with review of literature.

KEY WORDS : ADCON-L gel® · Lumbar surgery · Complication.

INTRODUCTION

The ADCON-L® gel (Gliatech, Cleveland, OH, USA), a carbohydrate polymer gel, was designed to provide a mechanical barrier of inhibiting the fibroblast migration and postsurgical adhesions around the neural structures^{7,8)}. It consists of a polyglycan ester and absorbable pig-derived gelatin in phosphate-buffered saline. It is applied to the dura and nerve roots during surgery to prevent scar and adhesion formation^{2,7,8)}.

Clinically, ADCON-L® gel has been used extensively to inhibit postoperative peridural scarring and adhesions following laminectomy, laminotomy, and discectomy, and many literatures, expressing positive opinions of ADCON-L® gel have been reported^{2,7,8)}.

However, there are a few case reports showing adverse event of this bioresorbable gel in the recent literature. Reported acute adverse events of ADCON-L® gel included back pain, radiculitis, and durotomy³⁻⁶⁾. Some reports showed the spontaneous intracranial hypotension and subdural hematoma due to spontaneous durotomy at immediate or early postoperative period with use of ADCON-L® gel³⁻⁶⁾. Even

inhibition of spontaneous posterior spinal fusion had been documented¹⁰⁾.

Though many cases of acute complications have been reported, delayed detected postoperative complication such as disturbance of muscle healing has been rarely reported.

We report the rare case of delayed detected complication of ADCON-L® gel which disturbed the muscle healing, and tried speculate the presumptive cause, which may be related to the decreased fibroblastic activity due to ADCON-L® gel.

CASE REPORT

A 40-year-old man presented with a 1-month history of back pain with fullness over the wound. In his past medical history, he had undergone successful microdiscectomy on the left at L4-5 due to intervertebral disc herniation and used the ADCON-L® gel to prevent postoperative adhesion one year ago. At that operation, the ADCON-L® gel had been gently applied at laminectomy site after meticulous bleeding control, and authors closed the muscle tightly after confirmation of well placement of gel. He had been quite well for 3 months after operation, though mild back pain remained and authors reassured that his back pain would be improved with time. He did not visit outpatient clinic until one month before visiting out-patient clinic again.

On physical examination at outpatient clinic, the detachment of back muscle from spinous process was suspected.

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The swollen wound site was compressible by the fingers, but tenderness or fever was not accompanied. Blood laboratory tests did not reveal any abnormal findings of infection and coagulopathy. Serous fluid was aspirated from the swollen wound. Nothing was cultured on that fluid. On radiologic examination, lumbar CT showed abnormal mass with fluid collection between detached muscles at L4-5 level of previous operation site, and this abnormal mass even extended to L5-S1 level

where previous operation was not performed. However, extension of abnormal mass was not seen at L3-4 level (Fig. 1). Authors decided to perform the explorative surgery to confirm the nature of abnormal mass and fluid in the muscles.

In surgical field, we could easily detect and pull out the mass, which was hardened gel like material (Fig. 2). Fortunately there was no severe adhesion between mass and muscles, and serous fluid was clear. In explorative examination, dura was intact and we could not find out any compressive lesion of neural structure including nerve root. We closed tightly to reattach the back muscles after irrigation with normal saline. The patient recovered after surgery with improvement of his back pain. He was discharged with somewhat relief from back pain fullness over the wound at postoperative 1 week and he could be completely free from back pain at 3 months of follow up at outpatient clinic.

However, due to the lack of chemical knowledge, we did not request the chemical experiment test about the component of this gel like mass to chemical laboratory and failed to confirm it by chemically.

DISCUSSION

ADCON-L® gel has been used in intraspinal lumbar surgical procedures as a temporary physical barrier to minimize post-operative peridural fibrosis, adhesions and subsequent clinical sequelae^{2,7,8}.

There have been many reports about the effectiveness of ADCON-L[®]^{2,7,8}. Petrie et al.³ insisted that ADCON-L[®] gel reduced 23% of peridural scar in comparison to the control group and brought a 120% increase in the number of patients having minimal or no scar. They also mentioned that ADCON-L[®] gel lessened the incidence of activity-related pain, in that matter, its use is safe, reduced peridural fibrosis, and improved postoperative patient outcome⁸. de et al.² also noted similar positive results in their prospective, multicenter, randomized, double-blind, controlled study of

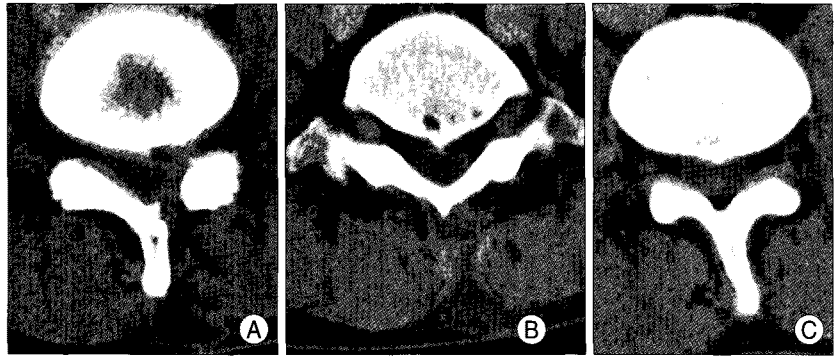


Fig. 1. Enhanced Lumbar CT. A : Margin of abnormal mass is slightly enhanced from laminectomy site to detached muscles at L4-5 level. B : Downward migration of abnormal mass to non-operative site on L5-S1 level is detected. C : Non-specific finding is seen at L3-4 level.

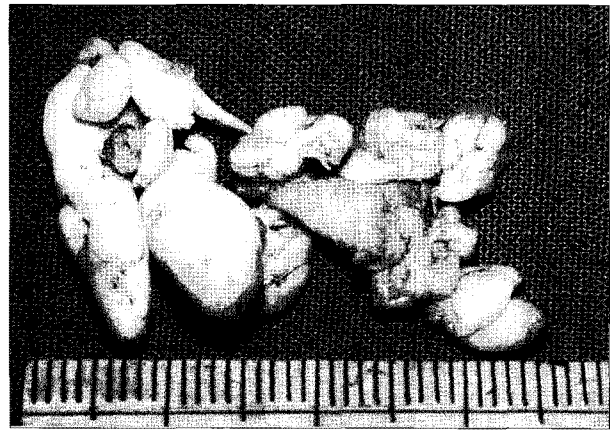


Fig. 2. Totally removed mass, nature of which is hardened gel

ADCON-L[®] gel. They insisted that ADCON-L[®] gel was shown to be safe and could inhibit peridural scar significantly compared with the control group and peridural scarring was reduced in group with ADCON-L[®] gel by direct visualization of scar tissue at the time of reoperation, and moreover they experienced better clinical outcomes than control patients². Even some reports mentioned the morphine-Adcon-L[®] compound reduced the postoperative pain after lumbar microdissectomy⁷.

On the other hand, there is negative opinion to the ADCON-L[®] gel. Richter et al.⁹ found no positive effect of treatment with ADCON-L[®] gel in terms of postoperative functional outcomes, except postoperative radiologic findings on magnetic resonance imaging.

Whether its effectiveness is significant or not, there have been a few reports about complication of ADCON-L[®] gel, and most of them were acute complications, such as durotomy, back pain, radiculitis, intracranial hypotension and subdural hematoma, related with durotomy. Delayed or late complication of ADCON-L[®] gel has been rarely reported except a few reports^{1,3-6,10}.

In this point, current report is somewhat meaningful in documentation of late postoperative complication of the

anti-adhesion barrier gel, which disturbed muscle healing after a one year of good postoperative period.

In review of the literature, more than 10 complication cases of dural leaks have been reported after lumbar discectomies associated with ADCON-L[®] gel³⁻⁶. Hieb and Stevens³ reported 5 patients of dural leak among 27 patients of lumbar discectomies with application of ADCON-L[®] gel. Kalogrianitis et al.⁴ reported hypotension during lumbar microdiscectomy with use of ADCON-L[®] gel, and Kuhn et al.⁵ documented bilateral subdural haematomata and lumbar pseudomeningocele due to a chronic leakage of cerebrospinal fluid after 2 weeks of a lumbar discectomy with ADCON-L[®] gel.

Though immediate period or acute stage of complications associated with ADCON-L[®] gel are documented in the literature occasionally, problem of late period, such as more than one year of good postoperative period, has been uncommon in review of the literature. However, lack of confirmative chemical report about the component of this gel like mass would be the critical limitation of our current case. Besides, we could not get the pathologic findings from this mass, because this material was not biological tissue.

We tried to figure out the pathophysiologic mechanism of muscle healing defect associated with ADCON-L[®] gel from the review of the literature. One of possible explanations of muscle healing defect could be antifibroblastic property of ADCON-L[®] gel which may inhibit the clot formation and healing of the paraspinous muscle. In the postoperative period, when the patients assume supine position and ambulation, gravitational flow of the ADCON-L[®] gel may drift to the back muscle and move to downward migration, which may lead to defect of muscle healing. In current case, extensions of abnormal mass between detached paraspinous muscle were seen on L4-5 and L5-S1 level, not on L3/4 level, which might support our presumptive explanation of gravitational flow. Similar mechanism was also assumed by cases reports of Le et al.⁶ From the analysis of 4 cases of symptomatic durotomy after lumbar microdiscectomy with use of ADCON-L[®] gel, they presumed that antifibroblastic property of ADCON-L[®] gel may inhibit dural healing, such that the pinhole tears could not undergo normal healing. And, rich source of fibroblasts may not come into contact with the dural defect to facilitate healing⁶. We speculate that similar outbreak can happen to the muscle and prevent the muscle healing.

Zou et al.¹⁰ also reported resembling report of Inhibition of spinal fusion by use of ADCON-L[®] gel. They concluded that ADCON-L[®] gel mixed into autogenous bone graft can delay or decrease bone formation at spinal arthrodesis sites, thus influencing the extent of spinal fusion¹⁰. However, in

our opinion, it might be somewhat leap that ADCON-L[®] reduced the spinal bone fusion, since there are multiple factors which influence the bone fusion rate.

On the other hand, we could assume that this case was simply related with acute complication of back pain. In other words, we passed over the back pain related with ADCON-L[®] gel at acute postoperative period. In current case illustration, patient felt the mild back pain even in postoperative 3 months of microdiscectomy. In that matter, we presumed another pathophysiologic mechanism that ADCON-L[®] gel subsequently migrated from lamiectomy site to weak point of muscle interface by exercise or posture.

Authors tried to figure out the two presumptive probable pathophysiologic mechanisms, and from this case, authors learned the lesson that we should observe the patient more closely not to overlook the problematic back pain from postoperative back pain when anti-adhesion material is applied at operation site.

CONCLUSION

We reported the rare case of late detected complication with use of Adcon-L[®] with possible mechanisms which may have disturbed muscle healing. We presume that decreased fibroblastic activity of ADCON-L[®] gel may be related with this unexpected state.

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