British Journal of Medicine & Medical Research
4(31): 5074-5082, 2014

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Endovascular Y-stent Graft Repair of Chronic Contained Ruptured Abdominal Aortic Aneurysm in High-Surgical Risk Patient

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Authors' contributions

This whole work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Case Study

Received 9th June 2014
Accepted 1st July 2014
Published 10th July 2014

ABSTRACT

Abdominal aortic aneurysm is a common condition and many a times asymptomatic. The mortality rate is high when it presents with rupture. However, a chronic contained rupture may remain undiagnosed for several weeks to months due to highly variable clinical presentation. Delay in the diagnosis and thereby delay in the treatment lead to worse clinical outcomes in patient experienced chronic contained rupture. We are here presenting a case of an adult patient who experienced rupture of infrarenal aortic aneurysm along with retroperitoneal hematoma. The abdominal aortic aneurysm was diagnosed after several months of rupture as the rupture occurred into the retroperitoneal cavity and remained confined in the retroperitoneal cavity. We successfully treated the patient by deploying a stent percutaneously.

Keywords: Ruptured abdominal aortic aneurysm; bifurcation stent grafting; endovascular repair; high surgical risk patient.

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1. INTRODUCTION

Abdominal aortic aneurysm (AAA) is a common condition and many a times asymptomatic. The mortality associated with AAA is found to be less than 5% [1]. However, when it presents with rupture, the mortality approaches to as high as 90% [2,3].

In majority of the patients, the rupture of AAA usually occurs acutely with triad of clinical presentation – sudden onset of constant abdominal pain (not altered by change in position), presence of pulsatile mass and hypotension [4]. However, there are some cases reported in which rupture was diagnosed after several weeks to months [5,6]. In these cases, the rupture occured in retroperitoneal cavity and was contained without further leakage. These are known as “Chronic contained rupture” or “Sealed rupture”. Even though the patient is having a chronic contained rupture, he remains hemodynamically stable but the rupture may progress to frank hemorrhage at any time. In addition to the risk of re-rupture, chronic contained rupture may lead to femoral neuropathy, left lower limb weakness, lumbar vertebral erosion, left psoas muscle hematoma or lumbar hernia [6-8].

So, the chronic contained ruptured aneurysm should be managed surgically or by endovascular repair. However, the safety and efficacy of endovascular repair of acute AAA is well-established but that of contained rupture is not. So, we are here presenting a case of adult patient who experienced rupture of infrarenal aortic aneurysm along with retroperitoneal hematoma. As the rupture occurred into the retroperitoneal cavity with the formation of hematoma, it was confined in the retroperitoneal cavity by the resistance of the periaortic tissue. Subsequently, the patient was successfully treated with percutaneous bifurcation stent grafting.

2. PRESENTATION OF CASE

A 50year old male patient, normotensive and non-diabetic, was referred to our clinic for percutaneous endovascular repair of AAA. The medical history of the patient revealed peripheral vascular disease (PVD) of both legs. Four months earlier, the patient attended one of the tertiary care centers with the chief complaints of backache, abdominal pain and dragging sensation of both legs for two months. He underwent diagnostic laparotomy which showed retroperitoneal mass, during surgery they suspected retroperitoneal fibrosis/neoplastic mass lesion could not find any other surgical cause, biopsy was done which revealed fibrotic tissue without any neoplastic evidence, computed tomography (CT) of abdomen was done but could not come to proper conclusion of diagnosis, due to diagnostic dilemma he was referred to another tertiary care hospital for further evaluation and management.

In another tertiary care hospital, he was thoroughly investigated. The CT revealed two projections from the posterior aspect of abdominal aorta at the level of fourth lumbar vertebra in infra-renal segment of aorta along with lobulated hypodense lesion with internal septa and minimal heterogeneous enhancement (noted in retro peritoneum) below the level of renal arteries along with infiltrating short segment of abdominal aorta and right lumbar aorta (Fig. 1). The biopsy of the retroperitoneal mass demonstrated fibrous tissue with resolving hematoma. Surgical oncologist ruled out the possibility of neoplastic mass. The patient was also treated for appendiceal mucocele by appendicectomy. However, the lesion was left undisturbed. Patient developed large incisional hernia after second laparotomy with herniation of bowel resulting in inconvenience to the patient due to large herniation while

sitting and standing compare to lying down position forcing the patient support lower abdomen with both hands. As there was development of large incisional hernia due to previous laparotomies, the patient was referred to our clinic for endovascular aneurysm repair.

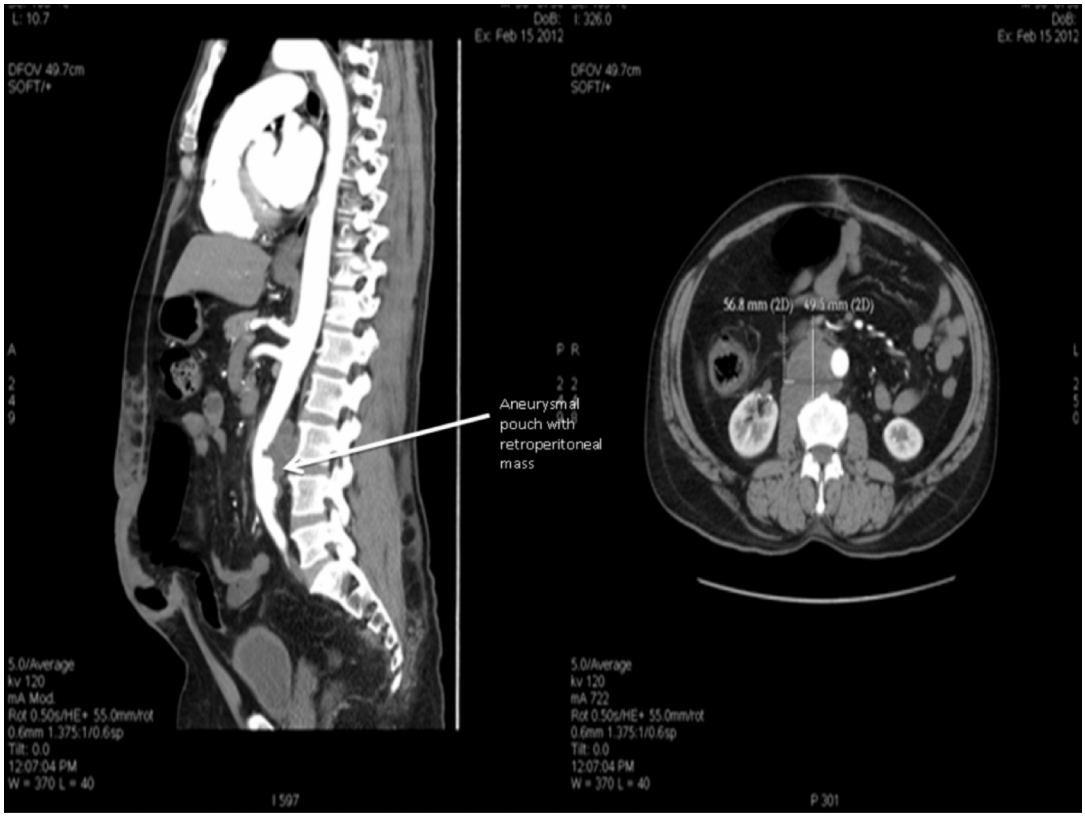

Fig. 1. CT revealing aneurysm at infra renal segment of aorta below the level of renal arteries along with retroperitoneal mass

The patient was at high surgical risk due to the history of PVD and presence of large incisional hernia as a result of previous laparotomy. We decided percutaneous Y–stent grafting of infra-renal AAA due to high risk of re-rupture after evaluating him for anatomical suitability.

Initially coronary angiography was performed through right femoral route using 6F Sheath (Cordis Corp., Johnson & Johnson, New Jersey) and 6F JL 3.5 catheter (Cordis Corp., Johnson & Johnson, New Jersey) & 6F JR 3.5 catheter (Cordis Corp., Johnson & Johnson, New Jersey). CAG was done to rule out associated coronary artery disease which is more oftenly associated in the presence of peripheral vascular disease and aortic aneurysm. In view of high risk status prior to any surgical and interventional procedure coronary artery disease was ruled out to avoid any coronary related events. The angiogram revealed normal coronaries. For the stent grafting, right femoral arteriotomy was performed. A 0.035x260cm Lunderquist® extra-stiff guide wire (COOK, Bjaeverskov Denmark) was introduced up to aortic arch using 5F Marker Pigtail. Another marker pigtail catheter was introduced through

left femoral route percutaneously. Aortogram was performed which showed aneurismal pouch - 5cm below the renal artery level towards the right side of the aorta without any aneurismal leak (Fig. 2).

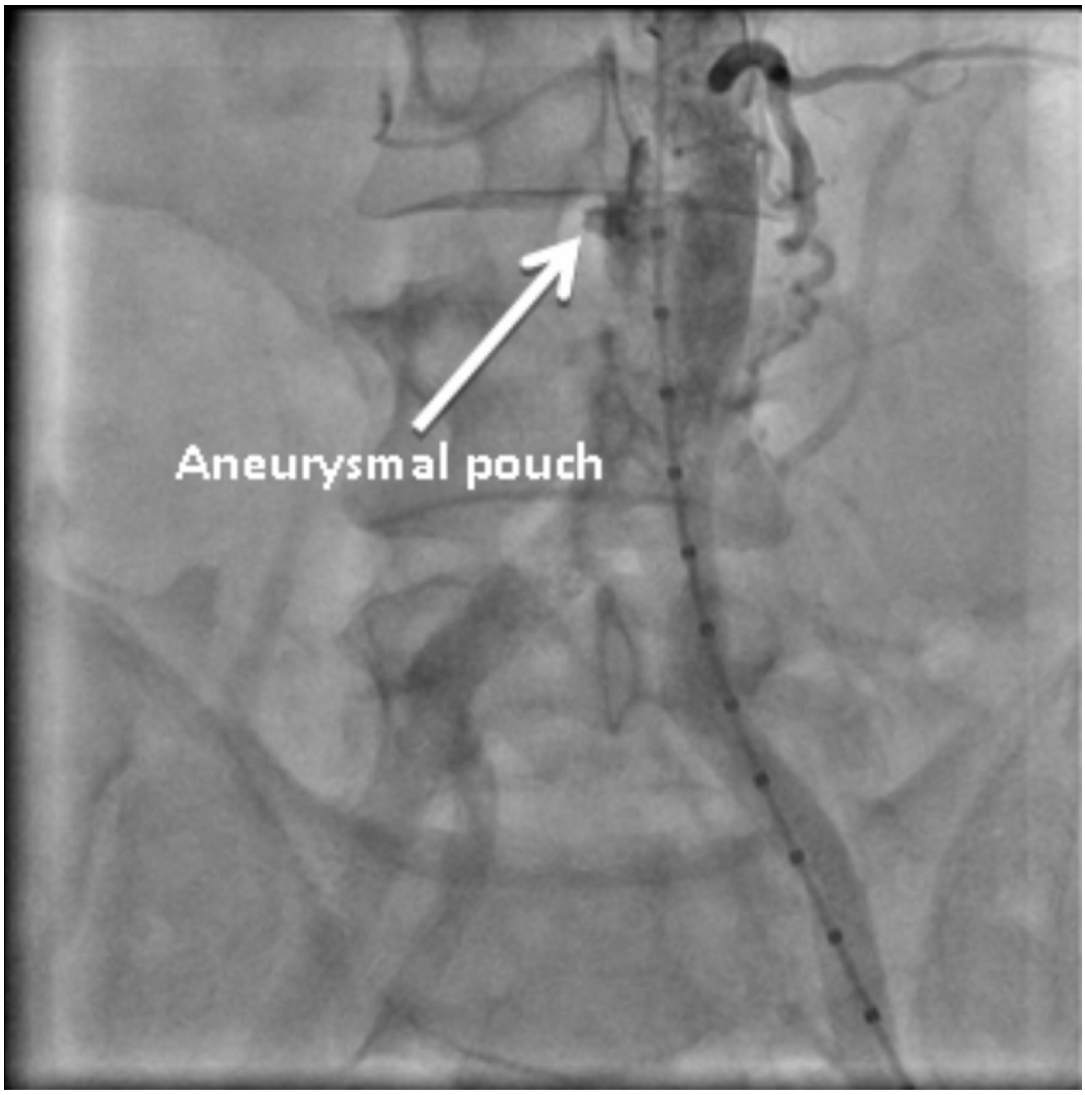

Fig. 2. Aortogram showing aneurismal pouch - 5cm below the renal artery level towards the right side of the aorta without any aneurismal leak

A 24mm x 82mm Zenith® bifurcation stent Graft (COOK, Bjaeverskov Denmark) was introduced through right femoral route and inadvertently the stent graft partially opened above the level of renal arteries. An aortography revealed partially opened stent graft placement above the origin of superior mesenteric artery (almost abutting above the origin of celiac axis). Even though stent graft was partially opened, it was pulled to lower level and placed just below the level of both renal arteries origin without compromising renal blood flow. The deployment of the stent graft was carried out using proximal gold marker on the

graft. The right limb common iliac cook stent graft was implanted using 12mmx56mm stent graft which was extended from right limb of the aortic stent graft to right common iliac artery. The left limb of the aortic stent graft was crossed with 0.035 x 260cm Lunderquist® Extra Stiff guide wire and pigtail catheter over which 12mmx73mm Cook Stent graft was inserted and implanted and extended from left limb of aortic stent graft to left common iliac artery. Post-procedural angiography showed well patent Y-stent graft without compromising origin of renal arteries and with antegrade flow across iliac arteries (Fig. 3). Left iliac stent graft was measured based upon its distal extension up to internal iliac artery in order to avoid compromise of iliac artery origin.

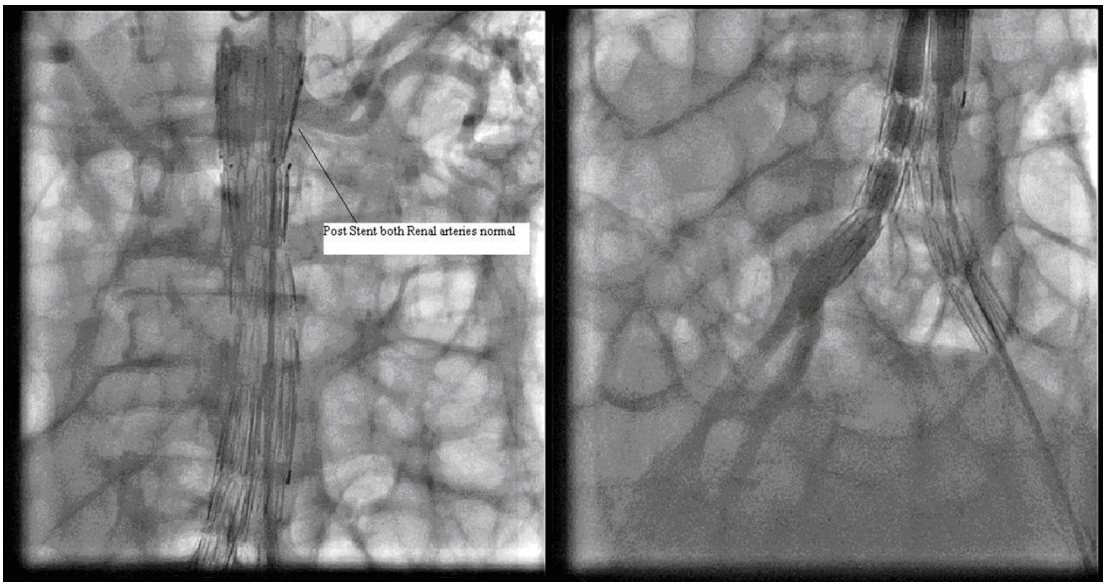

Fig. 3. Aortogram showing successful deployment of the bifurcation stent without compromising renal blood flow

The recovery of the patient was uneventful and was discharged from the hospital. The patient was treated for hernia surgically (mesh repair). He was followed after three months and CT angiograph revealed patent Y-stent with no endoleak and disappearance of aneurysm (Fig. 4).

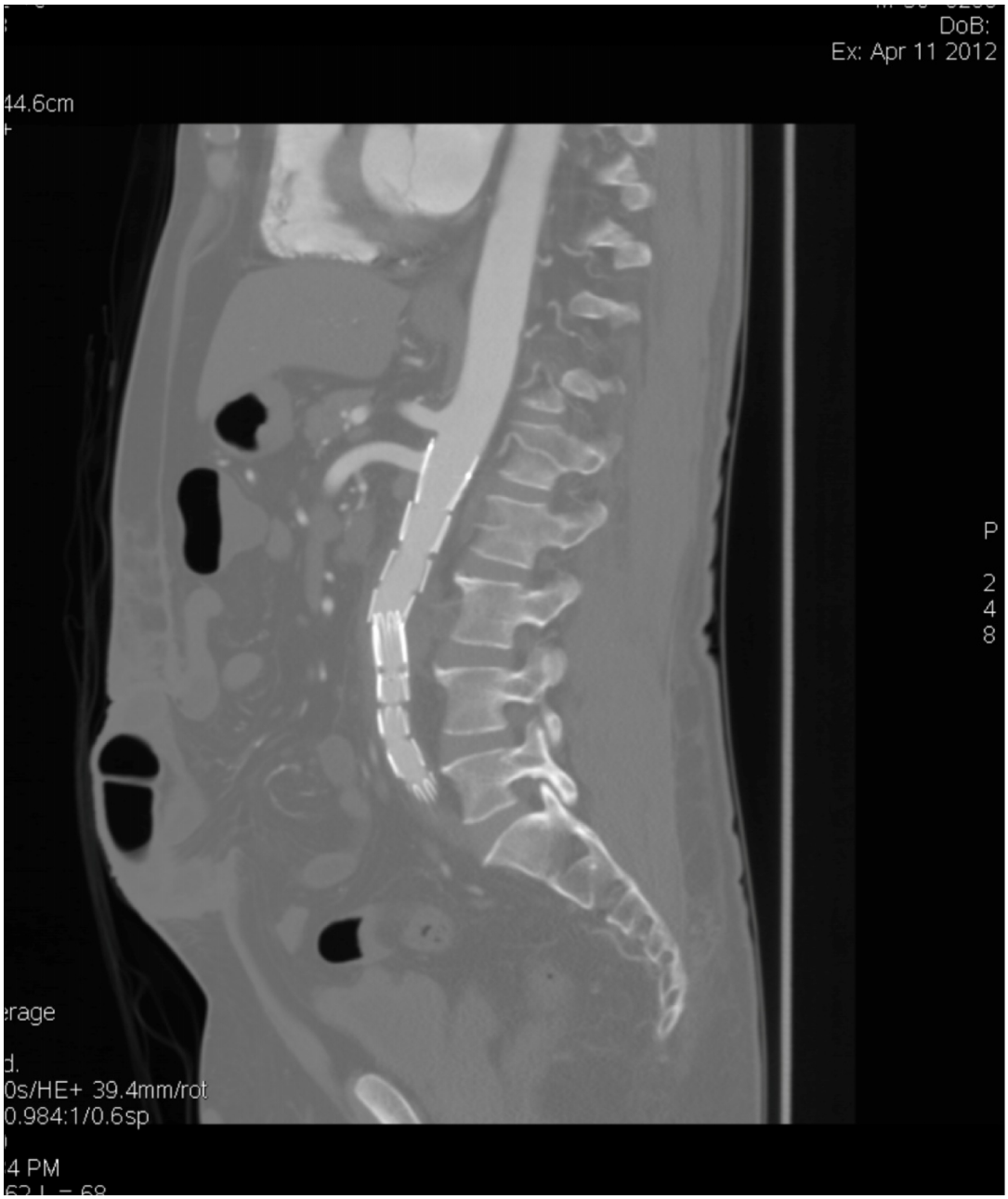

Fig. 4. CT angiograph after 3-months showing patent stent as well as disappearance of aneurysm

3. DISCUSSION

Infrarenal AAA, ruptures anteriorly into the peritoneal cavity, is seen in approximately 20% of patients which may lead to death of the patient due to resultant bleeding into the peritoneal cavity [9-11]. In contrast, the rupture into retroperitoneal cavity occurs in 80% of the patients

[10,11]. If the rupture occurs into retroperitoneal cavity (posteriorly), it may escape from the detection for weeks or months after rupture. If there is a small tear in postero-lateral wall of aneurysm, it leads to slow progressive retroperitoneal bleeding with a formation of hematoma. The rupture may remain confined without further leakage by the resistance of the periaortic tissues [7]. This rupture is known as “Chronic contained rupture” [12].

Chronic contained rupture clinically presents with continuous chronic back pain that may radiate to the groin and scrotum. Sometimes the patient experiences severe low back pain which may be remitted soon after the onset and then presented as weakness or pain in the lower extremities with intact pulses (in lower extremities) [6]. However, the patient remains hemodynamically stable [4]. Contained retroperitoneal rupture may also lead to vertebral erosion. Sometimes, the presence of retroperitoneal rupture compromises the femoral nerves and thereby leads to symptoms of femoral neuropathy [6]. Dobbeleir et al. [8] has reported a case of chronic contained rupture in which chronic contained rupture presented as a Grynfeltt lumbar hernia. Dargin et al. [13] had found acute rupture of the AAA while finding etiology of penile and scrotal ecchymosis.

Due to the non-specific clinical presentation of chronic contained rupture, the rupture may be delayed diagnosis. However, Jones et al. has suggested clinical and radiological criteria for the differential diagnosis of chronic contained rupture [14]. These criteria include: 1) known AAA; 2) previous symptoms of pain that may have resolved; 3) stable condition and normal hematocrit; 3) CT scan showing a retroperitoneal hematoma. CT is considered as a gold standard for the diagnosis of aneurysm rupture. The CT images showed irregular edges if it is acute rupture whereas the chronic rupture appears as well-defined and encapsulated [8]. In our case also, the patient developed severe backache for two months and CT finding was suggestive of retroperitoneal mass. Biopsy of the mass ruled out the possibility of neoplastic lesion and laparotomy confirmed the diagnosis of the aneurysm. The patient was referred to our clinic for further management due to high surgical risk. We suspected chronic contained rupture of the aneurysm based upon the criteria provided by Jones et al. as well as the clinical conditions of the patients when patient presented to the clinic with same complaints.
Long term survival has been reported in radiologically proven chronic contained ruptures which were left untreated due to co-morbidity [15]. However, there are several case-reports which indicate a need of urgent treatment for chronic contained rupture as it may progress to free rupture at any time even though there is hemodynamic stability [16,17]. Transabdominal repair of the AAA has been performed over the last 50 years. However, open repair of AAA is not without risk of mortality. By contrast, endovascular aneurysm repair (EVAR) has reduced physiological insult. EVAR is dependent upon aneurysm morphology. When an aneurysm has diameter less than 30mm, length greater than 10 mm and angulation less than 60, the aneurysm is considered suitable for EVAR [18]. In our case, the aneurysm was suitable for EVAR. Hsiao et al. has also reported the feasibility and safety of Zenith AAA bifurcated device for contained rupture in hemodynamically stable patient [19]. We decided to treat the patient with bifurcation stenting.

The patient tolerated the procedure well. Three months follow-up showed resolution of the symptoms and patent stent.

4. CONCLUSION

This case-report strengthens the safety of endovascular repair of chronic contained ruptured infra-renal abdominal aortic aneurysm and we encourage interventional cardiologist to introduce endovascular repair of ruptured abdominal aortic aneurysm in patient satisfied

hemodynamic and anatomical criteria. This case would be interesting to interventional radiologist as well as vascular surgeons in addition to interventional cardiologists.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

Authors have declared that no competing interest exists.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history.php?iid=590&id=12&aid=5273