

## CASE REPORT

## PEER REVIEWED | OPEN ACCESS

# Esophageal reconstruction with colon interposition for corrosive esophageal injury

Pedro Maurício Valente, A Catarina Quintela, J Pedro Gonçalves, Bárbara Costa Leite, Emanuel Guerreiro, António M Gouveia

## ABSTRACT

**Introduction:** Esophageal reconstruction is required to restore digestive continuity after resection of the esophagus and in patients with strictures that are not eligible for or have failed dilation. Colon is the replacement organ of choice when stomach is unavailable.

**Case Report:** The authors describe a case of a 72-year-old patient who suffered from complete gastric necrosis after premeditated acid ingestion. Emergent total gastrectomy was performed without immediate reconstruction. The patient spent several months under exclusive jejunostomy feeding before readmission to surgical digestive tract reconstruction. An esophageal severe stricture precluded its use and forced a colic interposition. The procedure was successful as well as the postoperative period, and the patient showed overall good functional and nutritional results. **Conclusion:** A minimum delay of six months is advised for intestinal reconstruction after a caustic lesion. If a colon conduit is needed, the colon side and the mediastinal route to use should be chosen on a case-by-case basis. A careful colon evaluation, otolaryngology and psychiatry consultations make part of the pre-operative requirements. Although

the use of colon interposition is technically demanding and has been associated with high morbidity, it stands as the preferred choice for esophageal replacement in patients without stomach or with gastric pathology. To choose an adequate intervention timing and an appropriate technique increase the chances for a successful reconstruction.

**Keywords:** Caustic ingestion, Esophageal reconstruction

### How to cite this article

Valente PM, Quintela AC, Gonçalves JP, Leite BC, Guerreiro E, Gouveia AM. Esophageal reconstruction with colon interposition for corrosive esophageal injury. J Case Rep Images Surg 2020;6:100079Z12PV2020.

Article ID: 100079Z12PV2020

\*\*\*\*\*

doi: 10.5348/100079Z12PV2020CR

Pedro Maurício Valente<sup>1</sup>, A Catarina Quintela<sup>1</sup>, J Pedro Gonçalves<sup>1</sup>, Bárbara Costa Leite<sup>1</sup>, Emanuel Guerreiro<sup>1</sup>, António M Gouveia<sup>2</sup>

**Affiliations:** <sup>1</sup>MD, General Surgery Department, Matosinhos Health Local Unit (ULSM), Portugal, Faculty of Medicine of Porto University, Porto, Portugal; <sup>2</sup>MD, PhD, Head of General Surgery Department, Matosinhos Health Local Unit (ULSM), Faculty of Medicine of Porto University, Porto, Portugal.

**Corresponding Author:** Pedro Maurício Valente, MD, General Surgery Department, Matosinhos Health Local Unit (ULSM), 4464-513 Senhora da Hora, Portugal; Email: pedrovalente90@hotmail.com

Received: 07 August 2020

Accepted: 21 September 2020

Published: 02 November 2020

## INTRODUCTION

In developed countries, ingestion of corrosive agents is a relatively rare but potentially fatal event. Beyond its possible short-term mortality, the aggressive interventions to ensure patient survival will imply a long hospital care need, likely with subsequent interventions, and may compromise the patient's functionality and autonomy in the future. Depending on the location and extension of injuries, patients may need several resections and esophageal diversion. The anatomical alterations, along with the discontinuity or dysfunctionality of gastrointestinal segments, will make it potentially difficult to restore an effective digestive tract.

Esophageal reconstruction is required to restore digestive continuity after resection of the esophagus, and in patients with strictures that are not eligible for

or have failed dilation [1]. Colon is the replacement organ of choice in the event of a previous gastrectomy or gastric pathology, and has been advised when a longer length of graft is necessary in both benign and malignant esophageal diseases [2–5].

## CASE REPORT

A previously active and autonomous 72-year-old man was admitted to our emergency room with impaired mental status and abdominal complaints. He was found fallen and unresponsive in his house and there was verifiable evidence of vomiting. His past medical history included a hypertensive cardiopathy, dyslipidemia, and hyperuricemia, all properly medicated.

At primary survey there was no airway compromise, no respiratory distress, and no hemodynamic instability, but he had a Glasgow Coma Scale of 10 without pupillary alterations or focal neurological deficits. The patient had alcoholic breath and his abdomen was tense, with guarding in the upper quadrants.

Laboratory tests were performed yielding the following results: white blood cell count  $21 \times 10^3$  cells/ $\mu$ L, hemoglobin 17 g/dL, positive benzodiazepine (lorazepam user), and positive blood alcohol (0.8 g/L). Arterial gasometry revealed a severe metabolic acidosis (pH 6.87, lactate 3.2 mmol/L).

There were no acute cerebral or thoracic alterations in the computed tomography (CT), but abdominal CT findings (free peritoneal air and fluid) suggested a gastric perforation (Figure 1).

The patient underwent exploratory laparotomy, where a complete transmural gastric necrosis and great curvature perforation were found (Figure 2). A total gastrectomy and feeding jejunostomy were performed. The esophageal and duodenal resection tops were stapled and abandoned, and a nasoesophageal tube was positioned.

The patient was admitted in the intensive care unit (ICU) with gradual improvement of multiple organ dysfunction, and he was extubated at the fifth postoperative day. When awake he confessed a suicide attempt with an acid agent (unknown). After psychiatric evaluation, medication for severe depression was started. Otolaryngology (ENT) evaluation did not find oral, pharyngeal, or laryngeal lesions and vocal cords function was preserved. During hospital stay, evisceration due to deep surgical site infection was corrected (12th day after surgery) and a jejunostomy revision was necessary.

The patient was discharged 48 days after the initial procedure. He lived six months under exclusive jejunostomy feeding (large-gauge probe allowing culinary diet), with planned nasoesophageal tube substitutions and under close psychiatric surveillance.

Six months later, the patient was enrolled to surgical reconstruction of the digestive tract. Follow-up endoscopic studies revealed extensive esophageal

sequelae with a stenosis localized at 30 cm from incisive arcade (Figure 3), making the esophagus non-viable to be used as a conduit. A colonoscopy and a mesenteric arteriography were performed and both revealed normal results. A reevaluation in ENT consultation also did not show any abnormalities and the surgical team planned a reconstruction with colonic interposition. The patient was then evaluated by psychiatry team one week before the procedure and was psychologically stable to engage in the proposed treatment.

During surgery, the access to the left hypochondrium was hardened by the presence of intense adhesions and fibrosis, dictating the use of right colon as the conduit. After right colon mobilization, temporary right and ileocolic arteries clamping was performed to ensure the adequate colon perfusion based on the middle colic artery and a patent marginal arcade (Figure 4). Those vessels were divided allowing right colon mobilization to the neck as a peristaltic graft, pedicled on the middle colic artery (Figure 5). Ileocecal valve and the last ileal 5 cm were preserved and appendectomy was performed in a routine manner. A left cervical approach was performed to isolate the cervical esophagus (Figure 6). The retrosternal route was chosen to place the conduit, avoiding the fibrosis in the posterior mediastinum (Figure 7). Three anastomoses were performed: cervical hand sewn end-to-end esophago-ileal, abdominal stapled (GIA 60 mm) end-to-side colo-jejunal (around 35 cm far from the duodenojejunal flexure), and stapled (GIA 60 mm) end-to-side ileocolic. An incidental cholecystectomy was also performed in the same operative time.

There was an overall favorable evolution in the postoperative period. The patient was under parenteral nutrition, starting water on the third day and liquid diet on

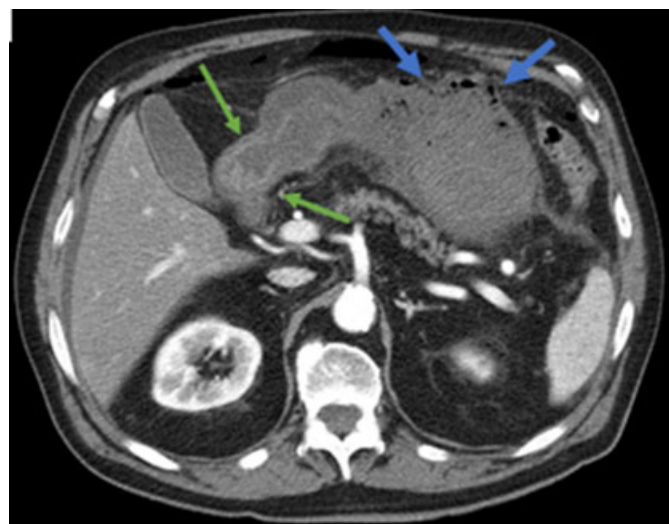


Figure 1: Computed tomography revealing pneumoperitoneum and peritoneal free fluid in per hepatic and perisplenic spaces. Perforation localized to the gastric greater curvature (blue arrows). No gastric wall enhancement except in the pyloric antrum (green arrows).



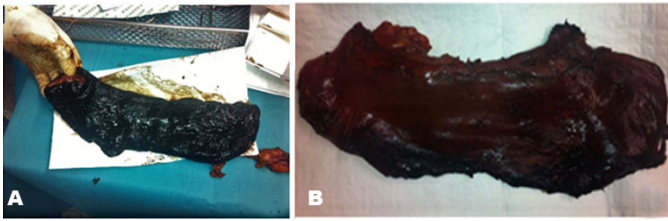


Figure 2: (A) Complete gastric necrosis. (B) The opened stomach.

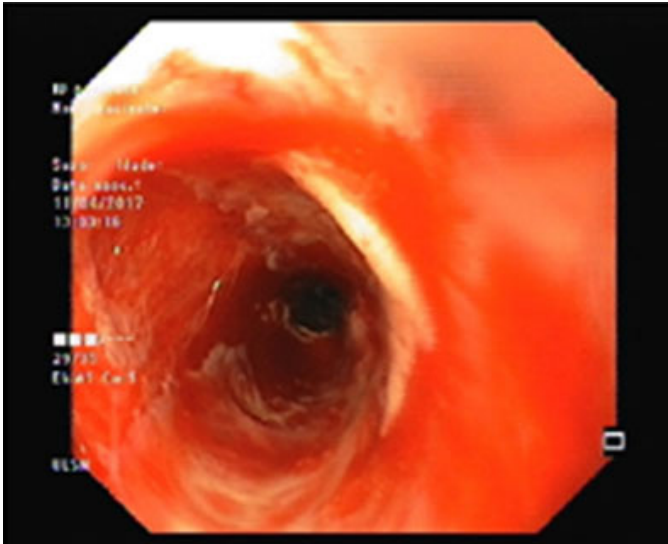


Figure 3: Endoscopic view of the proximal esophagus showing friability and extensive scarring with a non-traversable stenosis.

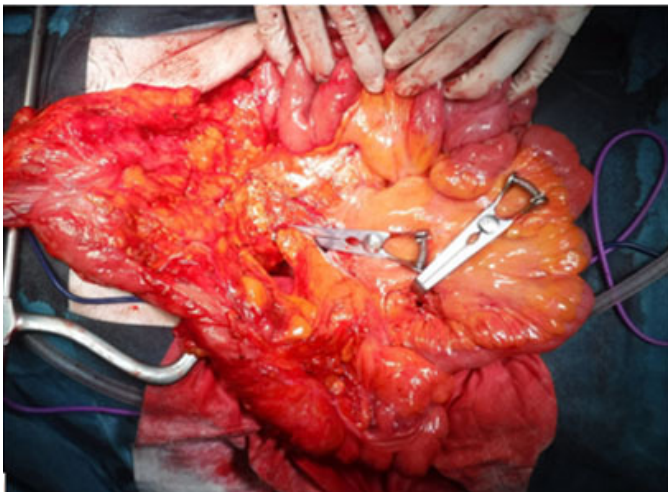


Figure 4: Adequate colon perfusion after right and ileocolic arteries temporary clamping.

the fifth day. There were complaints of discomfort during swallowing and diarrhea, which improved gradually after loperamide institution. The patient was discharged 14 days after surgery with favorable functional status, tolerating soft diet and with a stable mental condition.

The patient keeps attending surgery and psychiatry consultations, remaining able to realize his daily activities and progressively gaining weight. Both CT and endoscopy



Figure 5: The colic tube.

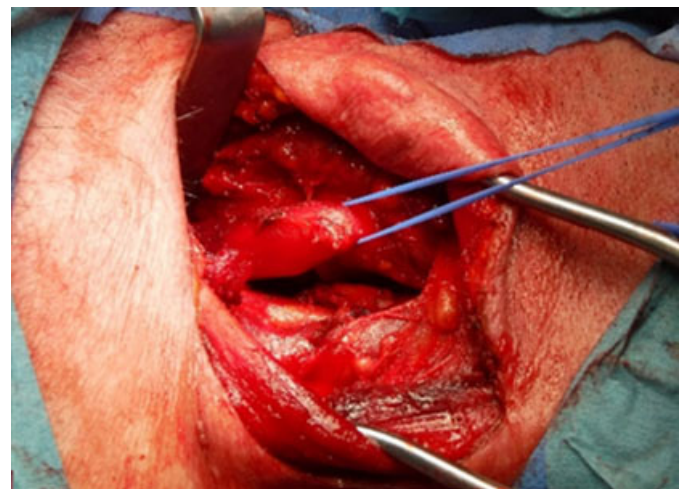


Figure 6: Cervical esophagus.

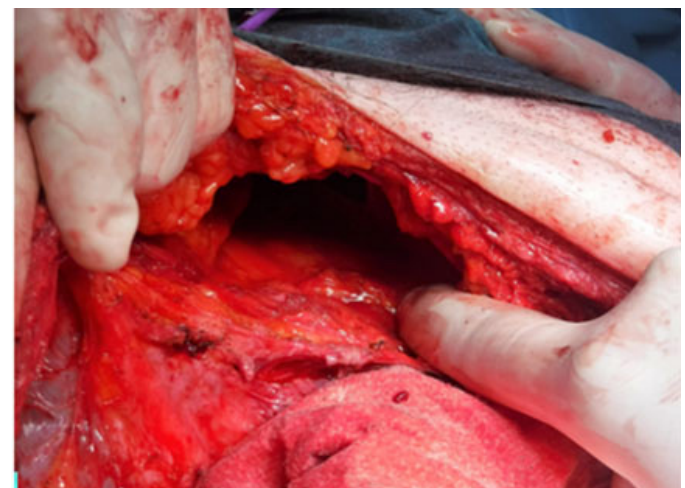


Figure 7: Retrosternal space view.

reevaluation were normal. In ENT consultation, a left vocal cord paralysis was found as the cause for a slight dysphonia.

## DISCUSSION

After an acute gastroesophageal injury requiring resection, as described in our case, the digestive reconstruction occurs in a second operative time. Early reconstruction attempts are not advisable and a minimum delay of six months allows lesions to stabilize and the patient to recover, which results in less late morbidity [6].

Stomach is the organ of choice for esophageal replacement because of its accessibility, elasticity, and good blood supply, allowing an easier and safer reconstruction compared to other conduits. In patients with previous gastrectomy or gastric disease, colon is the preferred substitute [2, 4, 5]. However, in spite of the colon's long length, reflux barrier action, and good quality of life outcomes, the procedure is longer and complex and requires more anastomosis, resulting in increased morbidity and mortality rates [2, 5].

Both retrosternal and posterior mediastinum routes are acceptable for conduit placement, but this decision should be done on a case-by-case basis. A hostile posterior mediastinum is expected to occur after corrosive ingestion, when this is the case, the retrosternal coloplasty is the gold standard [6].

Authors are not unanimous about which side of the colon should be used in esophageal replacement. In our patient, the gastrectomy sequelae made it easier to use the right colon in isoperistaltic position, with ileocecal valve preservation. This option is advocated by some authors due to esophageal-ileal congruence for anastomosis creation, the effects of ileocecal valve preservation in avoiding reflux and the positive functional effect of the graft's isoperistaltic position [4, 6]. Nevertheless, the reported results between the use of different types of grafts from right or left colon have been similar [1], which means that the decision should be made according to the patient's vascular anatomy, previous surgeries, and surgeon experience.

Preoperative psychiatric counseling, ENT evaluation, and colonoscopy are mandatory. Mesenteric angiography is indicated for patients over 50 years old, with previous colonic surgery, with abdominal aneurysm, or with known atherosclerosis. Bowel preparation is required [2, 6, 7].

Regarding the surgical procedure, some principles must be followed:

1. Verification of the presence of well-developed, long main vascular trunks, anastomosed with efficient arcades.
2. Assessment of a good perfusion of the graft (macroscopic appearance and pulse) before vessel division by temporary vessel occlusion with bulldog clamps [4, 7].
3. Extreme care with mesenteric vessels preservation, mainly at the graft mobilization to the neck, and use of the minimum vascular division possible for proper mobilization [4, 8].
4. Performance of a tension-free anastomosis.

5. Precise length and straight placement of the conduit to avoid future redundancy [7].
6. Special care on the retrosternal canal construction.
7. Widening of narrow points, namely the diaphragmatic hiatus and, if necessary, the thoracic inlet [6].

To follow these principles and to choose an adequate reconstruction timing are very important key points to prevent complications. Conduit necrosis and anastomosis leak are the most dreaded acute complications of this procedure [8]. Also, common later complications like stenosis, redundancy, or even reflux may result in functional failure and a subsequent reintervention. Although mucocele and carcinoma may occur due to the additional risk of the retained esophagus, its resection is not recommended routinely after corrosive injury [6].

## CONCLUSION

Colon interposition is the preferred choice for esophageal replacement in patients without stomach or with gastric pathology, even if its use is technically very demanding and has been associated with high morbidity. To choose an adequate intervention timing, an appropriate technique, and to follow several surgical principles increase the chances for a successful reconstruction. The preoperatively planning and optimization are essential points, along with a good supportive care and close follow-up after surgery.

## REFERENCES

1. Chirica M, Bonavina L, Kelly MD, Sarfati E, Cattani P. Caustic ingestion. *Lancet* 2017;389(10083):2041–52.
2. Gust L, De Lesquen H, Bouabdallah I, Brioude G, Thomas PA, D'Journo XB. Peculiarities of intra-thoracic colon interposition-eso-coloplasty: Indications, surgical management and outcomes. *Ann Transl Med* 2018;6(3):41.
3. Watson TJ, DeMeester TR, Kauer WK, Peters JH, Hagen JA. Esophageal replacement for end-stage benign esophageal disease. *J Thorac Cardiovasc Surg* 1998;115(6):1241–9.
4. Mine S, Udagawa H, Tsutsumi K, Kinoshita Y, Ueno M, Ehara K, Haruta S. Colon interposition after esophagectomy with extended lymphadenectomy for esophageal cancer. *Ann Thorac Surg* 2009;88(5):1647–53.
5. Klink CD, Binnebösel M, Schneider M, Ophoff K, Schumpelick V, Jansen M. Operative outcome of colon interposition in the treatment of esophageal cancer: A 20-year experience. *Surgery* 2010;147(4):491–6.
6. Chirica M, Veyrie N, Munoz-Bongrand N, et al. Late morbidity after colon interposition for corrosive esophageal injury: Risk factors, management, and outcome. A 20-years experience. *Ann Surg* 2010;252(2):271–80.



7. Popovici ZI. Esophageal reconstruction with colonic interposition. In: Khatri VP, editor. Atlas of Advanced operative Surgery. Philadelphia: Elsevier Saunders; 2013. p. 113–25.
8. Marks JL, Hofstetter WL. Esophageal reconstruction with alternative conduits. Surg Clin North Am 2012;92(5):1287–97.

\*\*\*\*\*

## Author Contributions

Pedro Maurício Valente – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

A Catarina Quintela – Acquisition of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

J Pedro Gonçalves – Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Bárbara Costa Leite – Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Emanuel Guerreiro – Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

António M Gouveia – Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

## Guarantor of Submission

The corresponding author is the guarantor of submission.

## Source of Support

None.

## Consent Statement

Written informed consent was obtained from the patient for publication of this article.

## Conflict of Interest

Authors declare no conflict of interest.

## Data Availability

All relevant data are within the paper and its Supporting Information files.

## Copyright

© 2020 Pedro Maurício Valente et al. This article is distributed under the terms of Creative Commons Attribution License which permits unrestricted use, distribution and reproduction in any medium provided the original author(s) and original publisher are properly credited. Please see the copyright policy on the journal website for more information.

Access full text article on  
other devices



Access PDF of article on  
other devices





INTERNATIONAL JOURNAL OF  
CASE REPORTS AND IMAGES



VIDEO JOURNAL OF  
CLINICAL RESEARCH



VIDEO JOURNAL OF  
BIOMEDICAL SCIENCE



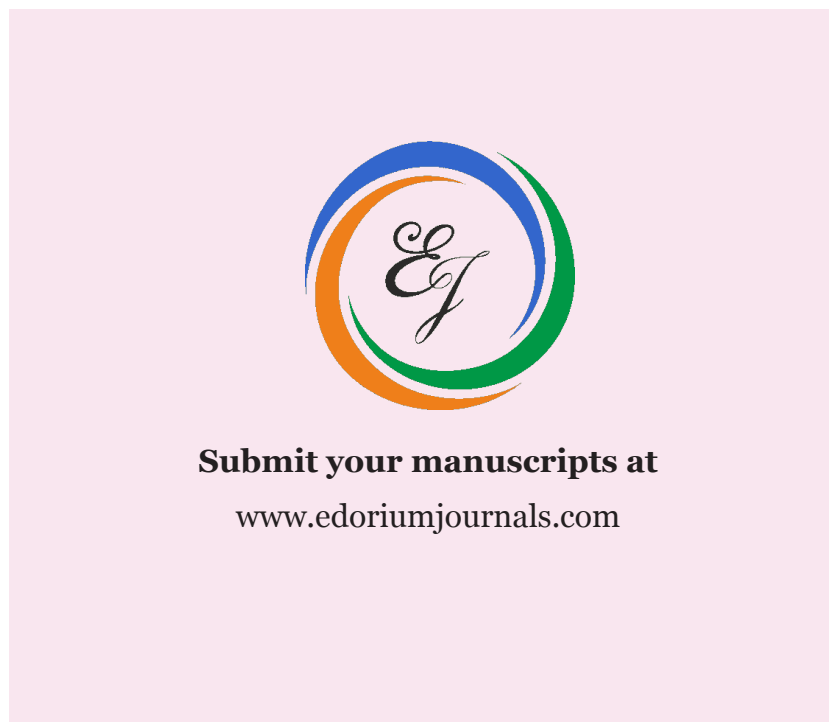
INTERNATIONAL JOURNAL OF  
HEPATOBIILIARY AND  
PANCREATIC DISEASES



INTERNATIONAL JOURNAL OF  
BLOOD TRANSFUSION AND  
IMMUNOHEMATOLOGY



EDORIUM JOURNAL OF  
OPHTHALMOLOGY



EDORIUM JOURNAL OF  
MEDICINE



EDORIUM JOURNAL OF  
CARDIOTHORACIC AND  
VASCULAR SURGERY



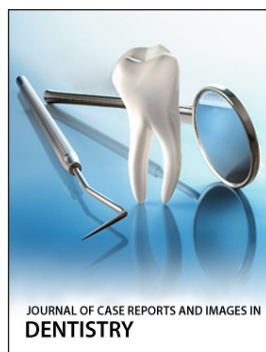
JOURNAL OF CASE REPORTS  
AND IMAGES IN ORTHOPEDICS  
AND RHEUMATOLOGY



EDORIUM JOURNAL OF  
PSYCHOLOGY



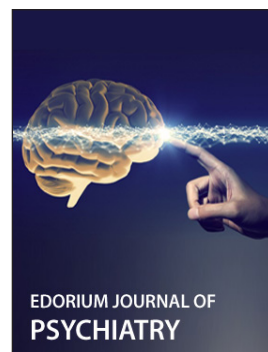
EDORIUM JOURNAL OF  
CELL BIOLOGY



JOURNAL OF CASE REPORTS AND IMAGES IN  
DENTISTRY



EDORIUM JOURNAL OF  
CANCER



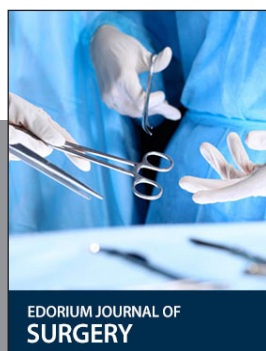
EDORIUM JOURNAL OF  
PSYCHIATRY



JOURNAL OF CASE REPORTS AND  
IMAGES IN INFECTIOUS DISEASES



EDORIUM JOURNAL OF  
ANATOMY AND EMBRYOLOGY



EDORIUM JOURNAL OF  
SURGERY



JOURNAL OF CASE REPORTS  
AND IMAGES IN PATHOLOGY



EDORIUM JOURNAL OF  
ANESTHESIA