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INSIDE

Stereotactic Body Radiotherapy (SBRT) for Primary & Metastatic Lung Tumours: A Noninvasive & Effective Treatment Modality

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INTRODUCTION

Stereotactic Body Radio Therapy (SBRT) involves a brief, intensified regimen of tightly focused external radiotherapy that targets one or more discrete extracranial lesions. Stereotactic positioning is very precise and as a result, SBRT can deliver much higher doses per fraction than conventional radiation. Challenge in SBRT of lung tumours is organ motion. Tumour has to be tracked constantly during breathing cycle so as to accurately deliver ablative dose of radiation with minimal dose to the surrounding tissue.

SBRT is being increasingly used in the management of early stage Non–Small-Cell Lung Cancer (NSCLC) for patients in whom medical co-morbidities or other contraindications preclude the use of surgical resection. Increasing numbers of reports are now being published describing the feasibility, safety, and efficacy of this treatment Modality [(1-12)]. These reports describe high rates of local control exceeding 90% and overall survival with remarkably very low incidence of high-grade acute and chronic toxicities in primary lung cancers.

Systemic therapy remains the standard of care for the patients with metastatic disease. In 1995, Hellman and Weichselbaum [(13)] coined the term "oligometastases" to describe a less advanced state of metastatic disease, amenable to potentially curable local therapy, resulting in better disease free survival. Previous studies done for lung metastatectomy have shown 5 years survival rates ranging from 27-43 %. SBRT for lung metastasis have shown promising results with 3 years local control rates ranging from 80-90 %.

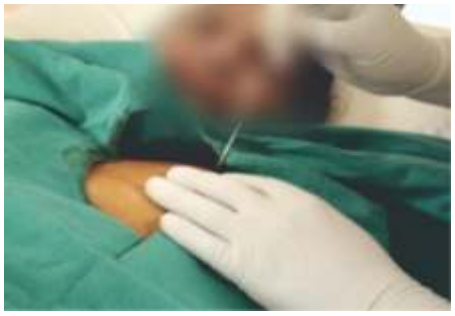
SBRT PLANNING

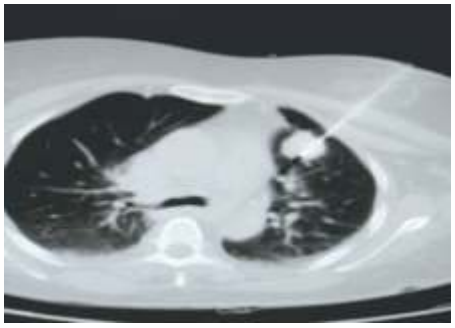
Patients are immobilized in supine position with knee rest and using "inhouse" modified or fit cast placed around mandible and neck. To address tumour motion our centre uses

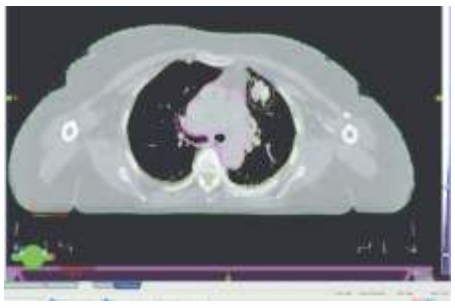
either RPM based 4DCT image acquisition or internal marker based "Exactrac Gating". For central lesions RPM device is used. In RPM based "Gated" treatment, 4DCT scan is acquired after coaching the patient to follow audible breathing command so as to create a reproducible respiratory wave form. 4DCT uses multi-slice CT scanner combined with a respiratory surrogate to develop a series of 3DCT scans each representing the patient in a different respiratory phase. Lung cancers are typically treated in end expiratory phase when the tumor is most stable. After acquisition of 4DCT scan, phases of breathing are selected in expiratory phases and Average Intensity Projection (AIP) of these phases is generated. Gross Tumor Volume (GTV) delineation is done on AIP images. PTV margins are given for setup variation by expanding GTV 5mm in axial direction and 10mm craniocaudal. During treatment, setup is verified by cone beam CT scan and treatment is delivered in selected phases.

EXACTRAC GATING

First Visicoil Gold Marker is implanted in the lung under CT guidance near the tumour by the interventional radiologist. These markers stay inside body without causing any harm. Patient is called for planning (CT simulation) after 5 days to ensure marker stability. Planning CT Scan is acquired in expiratory breath hold with contrast.







We followed three dose schedules viz 55Gy/5#, 60Gy/3# and 50Gy/10#. Dose is prescribed to PTV between 75-90% isodose line. Violation to the constraints for the spinal cord, proximal bronchi, vessels, esophagus is not acceptable. PTV coverage with the lower isodose lines were considered whenever tumor is close to critical structures. For those patients where target coverage is compromised due to close proximity to critical structures different dose schedules are selected so as to respect normal tissue dose volume constraints.

Patient is treated on Novalis Tx Radiosurgery system which has high definition MLC of 2.5mm width and BrainLAB ExacTrac X-Ray 6-D patient positioning system. Day-to-day patient positioning verification is done by using either CBCT or with orthogonal X-rays based Exactrac system. X-Rays are acquired in inspiratory, mid exhale and expiratory phases to calculate the relative movement of the marker with respiration. Then the treatment window is selected so that the movement of the tumour is within the PTV margins during the Beam on period. Snap shot X-rays are acquired by Exactrac system during treatment to confirm the accuracy of marker position. Treatment is delivered with an accuracy of 1-2 mm.

DATA ANALYSIS OF PATIENTS TREATED AT MAX CANCER CENTRE

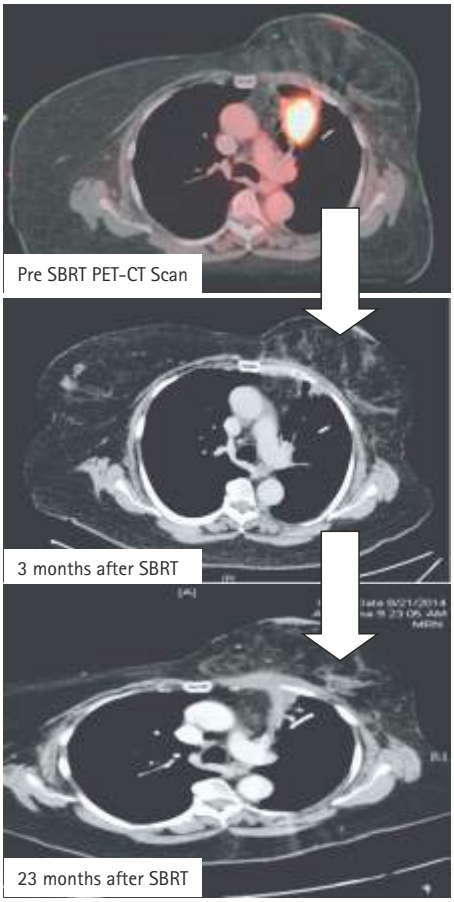
Retrospective analysis was done for 21 patients treated with SBRT for primary and metastatic lung lesions between March 2010 to March 2014. Their characteristics are listed in Table 1.

Table 1: Patient characteristics

Number	14 Primary, 7 Metastatic
Age Median Range	 65 Years (29-81)
Sex Male Female	 13 8
Gross Tumour Volume Equivalent Diameter	0.41-81 cc 0.2-5.4 centimeter
Histology Primary Metastatic	 8-Adenocarcinoma, 6-Squamous 4-Adenocarcinoma, 2- Squamous, 1-Sarcoma

RESULTS

Out of twenty one cases fourteen had primary lung cancers (4 central, 10 peripheral) while remaining seven were metastatic. Age of patients ranged from 29-81 years (median = 65 years), 13 patients were ≥65 years, 6 patients being ≥75 years. The GTV volume and the equivalent diameter for primary lung lesions ranged from 11-81 cc and 2.8-5.4 cm, respectively. Seven patients had oligometastatic disease with total 12 lesions. Primary sites were larynx, breast, cervix, gall bladder, rectum and one patient had extremity soft tissue sarcoma. GTV volumes ranged from 0.41-42.8 cc while equivalent diameter was 0.2-4.3 cm. Median follow up of 13.5 months (range 4-29 months). One patient with metastatic disease was lost to follow up. Remaining twenty patients are locally controlled till last follow up as confirmed by follow up CT/PET-CT Scan done after 3-4 months of SBRT and then three monthly CECT Scans.



TOXICITY

The adverse events resulting from SBRT were classified using the Common Terminology Criteria for Adverse Events, version 3. Pulmonary toxicity was observed as cough, dyspnea, pneumothorax and radiographic changes. The symptoms of most patients were mild and did not interfere with their activities of daily living. Grade 1 skin toxicity with faint erythema was observed only in one patient in which lesion was close to chest wall. No patient had fracture of the rib and musculitis of the chest wall. No adverse effects of the spinal cord, great vessels, or esophagus were observed. One patient had asymptomatic pneumonitis at 3 months which was detected on follow up CT scan. It was managed conservatively. One patient had asymptomatic pneumothorax after Visicoil gold marker placement which resolved spontaneously and did not required any intervention. None of the patient developed grade 3 or 4 toxicity.

CONCLUSION

The preliminary results demonstrate that high-dose SBRT is safe and effective modality with promising results for the treatment of patients with primary as well as metastatic lung cancer. Results at our centre though early show the same trends as the internationally reported literature. Local control at a median follow up of 13.5 months is 100%. It is a safe and well tolerated treatment modality even in elderly population as more than 60% (13/21) of our patients are more than 65 years with multiple co-morbidities. Therefore SBRT is an effective alternative to surgery in early stage lung cancer with high control rates and low morbidity as compared to surgery.

Table 2: Observation and results

Dose Schedules	50Gy/10# - 5 patients 55Gy/5# - 13 patients 60Gy/3# - 3 patients
Frequency of Treatment delivery	2-4#/week 5Gy/# - four days a week >5Gy/# - twice a week
Follow up	Median=13.5 months (Range 4-29 months)
Local control	100%
Toxicity: Marker related	**1-Patient:** Self resolving pneumothorax
Toxicity: SBRT Related	**1-Patient:** Asymptomatic pneumonitis **1-Patient:** Grade 1 skin toxicity NO GRADE II-IV TOXICITY

Novalis Tx Machine at Max Cancer Centre

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Biggest Loser Contest

Sticking to a weight-loss programme is very difficult and requires a lot of sacrifice in terms of food.

Because changing your eating habits does not come easily, it is only too easy to convince yourself that it is not worth the trouble and quickly backslide into bad habits. In fact, negative thinking is probably biggest enemy when you are trying to lose weight. This reason was big enough for Dietetics Department to plan out a "Weight Loss Challenge Programme" for Max Healthcare Employees on the occasion of Nutrition Week Celebration 2014.

A total of 35 candidates with a BMI of above 30 were enrolled in the programme out of which 15 were male and 20 females.

In the first week of July complete Body Fat Analysis was done of all the participants to see their fat % and also there waist circumference was noted.

An integral part of this programme was to give Weekly Diet plan followed by regular follow ups. Oats was incorporated in the diet of all the participants to spread its healthy nutritional benefits. Participants were also provided samples of Meal Replacer & fat burn capsules. After 2 months of regular follow up, the final weight, fat analysis and waist circumference was taken of all the participants. The data was collected and sent to Clinical research team for analyzing.

1. The average weight loss was 2.5 kgs in men and 3.28kg in females.
2. Mean fat loss was 1.82kgs in men and 2.6 in females
3. Mean Inch loss was 1.25 in males and 1.61 in females.

Winners were awarded with gift coupons worth Rs 5000/- each along with trophy

1. Maximum weight loss category: Dr. Abhishek from Radiation Oncology he lost 6.4 kgs.
2. Maximum fat loss in kgs: Mr. Gaurav from Commercial, he lost 6 kgs of absolute fat.
3. Maximum inch loss was 4 inch with a weight loss of 4.6 kgs: Ms. Rakhi from Front office.

Consolation prizes were given to all the participants who were very close and deserve to be applauded for their effort. Mr. Vipin who lost 3 kgs, with an inch loss of 4 and Ms. Sujata who was very close with 5.8 kgs of weight loss and 4.6 kgs of fat loss.

	Males	Females
Weight Reduced (%)	2.4%	3.0%
Inch Loss (%)	2.6%	4.0%
BMI Reduced (%)	2.7%	3.3%
Fat Loss (%)	6.1%	7.3%

	Initial Weight	Final Weight	Weight Loss	Initial Waist	Final Waist	Inch Loss	BMI (Pre Diet)	BMI (Post Diet)	Reduced BMI	Initial fat	Final fat	Fat Loss
Males	93.86	91.57	2.29	40.5	39.5	1	31.65	30.79	0.86	37.28	35.01	2.27
Females	76.97	73.69	3.28	40.69	39.08	1.61	31.74	29.73	2.01	35.69	33.09	2.6

EBUS Bronchoscopy
– A New Dimension in Bronchoscopic Evaluation of the Mediastinum

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EBUS BRONCHOSCOPY

Endobronchial Ultrasound (EBUS) is a technique that uses ultrasound along with the bronchoscope to visualize the airway wall and structures adjacent to it.

CLINICAL USES

EBUS TBNA (Transbronchail Needle Aspiration) can help visualize and allow physicians to sample and diagnose various mediastinal abnormalities, including tuberculosis, sarcoidosis and mediastinal lymphoma.

EBUS-GS (EBUS Guide Sheath) FNA (Fine Needle Aspiration) can visualize and allow sampling of pulmonary nodules that are not visualized by fluoroscopy and may avert the need for surgical procedures.

EBUS has been incorporated into routine practice in many centers in the west because of its high diagnostic informative value and low risk. It has replaced more invasive methods for evaluating mediastinal lymphadenopathy and staging lung cancer.

IS IT AN OUT-PATIENT OR IN-PATIENT PROCEDURE?

In majority of cases, this procedure can be done under Local Anaesthesia with conscious sedation in an out patient setting and the patient is sent home within 2-3 hours of the procedure. In the elderly or in patients with multiple co-morbidities, it is preferable to admit the patient for a night and do the procedure under general anaesthesia usually using a Laryngeal Mask.

ROSE

ROSE (Rapid Onsite Evaluation) is the real time assessment of the TBNA slides by a cyto-pathologist. It is like a frozen section evaluation. It helps to tell the Bronchoscopist while he is still doing the procedure whether his samples taken are adequate or not for establishing the diagnosis. This helps to reduce overall time of the procedure and increases the efficiency and yield and reduces the risk of complications of the EBUS TBNA procedure.

EBUS AT MAX SAKET?

We are routinely doing EBUS Bronchoscopy with ROSE for the last 1 year at Max-Saket. We have done almost 200 cases in one year and our diagnostic yield is over 90%. The spectrum of cases we see are mainly Tuberculosis (60%), Sarcoidosis (20%), Malignancy (15%) and Anthracosis (5%).

Figure 1: EBUS TBNA Bronchoscope tip with Ultrasound Transducer and Needle

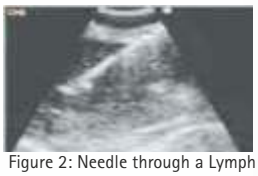

Figure 2: Needle through a Lymph node – Ultrasound Image in real time during EBUS Bronchoscopy

Figure 3: EBUS Equipment

Vitamin D Status in Morbidly Obese Pre & Post Bariatric Surgery Patients in Indian Population

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ABSTRACT

Chronic Vitamin D Deficiency (VDD), inadequate calcium intake is common in obese individuals placing them at risk for low bone mass and metabolic bone diseases. After bariatric surgery, they are at even higher risk owing to mal absorption and decreased oral intake. The study determines the incidence of vitamin deficiency in pre and post operative morbidly obese adults and is there a need for prophylaxis dose of vitamin d for morbid obese adults.[3]

Objectives: To evaluate vitamin D levels in preoperatively morbidly obese adults and postoperatively at 3 & 6 months who have undergone restrictive bariatric surgery (laparoscopic gastric bypass or sleeve gastrectomy).

Method: Retrospectively data was collected from the hospital lab records and surgical database in 205 subjects who had undergone restrictive bariatric surgery (laparoscopic gastric bypass or sleeve gastrectomy) between the periods of April 2013 to January 2014. Vitamin D levels preoperatively and 3-6 months post-operatively were taken into account.

Results: 205 patients had been operated during the study period. Pre-operative characteristics: 56.58% females; 43.41% males; mean age 42.68 + 12.02; mean weight 124.9 + 24.95; BMI 44.96 + 11.22. Vitamin-D checked preoperatively; 58.79% (30.34% males and 28.45% females) had significant vitamin D deficiency (<30 ng/ml) and 18.47% (8.99%

males & 9.48% females) had severe Vitamin D deficiency (<10 ng/ml). Post-operative characteristics: All patients were started on calcium, vitamin D and multivitamin supplements post-operatively; 49.8% (21.35% males & 28.45% females) and 38.67% (17.98% males & 20.69% females) still had significant Vitamin D Deficiency post-operative 3-6 months, respectively. 9.33% (6.74% males & 2.59% females) and 3.97% (2.25% males & 1.72% females) were severe Vitamin D Deficient post-operative 3 - 6 months.

Conclusion: Vitamin D Deficiency is highly prevalent among obese adults referred for bariatric surgery. Pre-operative assessment and active treatment of vitamin D would be beneficial rather than routine post operative supplementation

Keywords: Obesity; Vit-D; Bariatric Surgery

INTRODUCTION

Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population. Data regarding the nutritional status of adults, as determined by Body Mass Index (BMI), indicate that 50% of Indian adults suffer from different types of chronic energy deficiency, in that they have a BMI <18.5 kg/m2 . In the same survey, it was observed that the BMI values were similar in men and women; however, there were more overweight/obese (BMI ≥25 kg/m2) women (6.6%) than men (3.5%). In certain regions, obesity and consequent diseases are posing an enormous public health problem.[1]

The presence of nutritional deficiencies in overweight and obesity may seem paradoxical in light of excess caloric intake, but several micro-nutrient deficiencies appear to higher in prevalence in overweight and obese adults and children.[9]

India is a country with abundant sunshine but still a high prevalence of vitamin D deficiency has been documented amongst all the age groups in the range of 50-90%. [2]

As the obesity epidemic continues unabated and the popularity of bariatric surgery rises for both severely obese adults and adolescents, medical practitioners must be aware of pre-existing nutritional deficiencies in overweight and obese patients and appropriately recognize and treat both common and rare nutritional deficiencies that may arise or worsen following bariatric surgery.[9]

Recently, several studies in adults have revealed an inverse relationship between body fat and serum 25-hydroxyvitamin D3 [25(OH) D] levels, the relevant marker of low vitamin D status. Although vitamin D is well known for its essential role in bone metabolism and calcium homeostasis, increasing evidence is linking vitamin D to obesity.[4]

Taking daily micro-nutrient supplements and eating foods high in vitamins and minerals are important aspects of any successful weight loss programme. For the morbidly obese, taking vitamin and mineral supplements is essential for appropriate micro-nutrient repletion both before and after bariatric surgery. Studies have found that 60–80% of morbidly obese preoperative candidates have defects in vitamin D. Such defects would reduce dietary calcium absorption and increase a substance known as calcitriol, which, in turn, causes metabolic changes that favor fat accumulation.[5]

Chronic vitamin D deficiency, inadequate calcium intake, is common in obese individuals, placing them at risk for low bone mass and metabolic bone disease. After bariatric surgery, they are at even higher risk, owing to mal-absorption and decreased oral intake. Meticulous preoperative screening, judicious use of vitamin and mineral supplements, addressing modifiable risk factors, and monitoring the absorption of key nutrients postoperatively are essential in preventing metabolic bone disease in bariatric surgery patients.[3]

METHOD

Retrospectively data was collected from the hospital lab records and surgical database in 205 subjects who were ≥ 18 years, BMI >37.5, either male or female had undergone restrictive bariatric surgery (laparoscopic gastric bypass or sleeve gastrectomy) between the periods April 2013 to January 2014 were selected for the analysis in the study. Vitamin D levels preoperatively and 3 & 6 months post-operatively were taken into account. Approval from the institutional ethics committee of the hospital was taken prior to collation of data.

RESULTS

205 patients had been operated during the study period. Pre-operative characteristics: 56.58% females; 43.41% males; mean age 42.68 + 12.02; mean weight 124.9 + 24.95; BMI 44.96 + 11.22 as in table 1. As seen in table2, Vitamin D checked pre-operatively; 58.79% (30.34% males and 28.45% females) had significant vitamin D deficiency (<30 ng/ml) and 18.47% (8.99% males & 9.48% females) had severe vitamin D deficiency (<10 ng/ml). Post operative characteristics: all patients who had got routine Vitamin D supplements post-operatively; about 49.8% (21.35% males & 28.45% females) and 38.67% (17.98% males & 20.69% females) still had significant vitamin D deficiency (<30ng/ml) post operative at 3-6 months respectively. 9.33% (6.74% males & 2.59% females) and 3.97% (2.25% males & 1.72% females) were severe vitamin D deficient (<10 ng/ml) post operative 3-6 months. (Table 2)

DISCUSSION

In the present study of 205 patients vitamin D deficiency was more when evaluated pre-operatively and post-operatively as seen in the table 2, similar to studies previously reported [6, 7, 9]. However, pre-operatively VDD was more in comparison to post-operatively for all patients who also had got routine vitamin D supplements.

The current study gives important clinical information that increased supplements of vitamin D is required even when given routinely post surgery. This indicates that the possibility of starting vitamin D supplements prior surgery will help reducing vitamin deficiency substantially. In our study females (56.58%) were more than males (43.41%) comparatively in 205 patients in evaluated population which is similar to earlier studies. [1,2]

Studies have shown prevalence of nutritional status and vitamin D deficiency pre and post bariatric surgery[7,8]. A longer follow-up is required to know the time taken in normalization of vitamin D in such patients. Active treatment will be beneficial for patients undergoing restrictive bariatric surgery. Our study findings suggests, if an optimal dose can be determined for vitamin D deficiency this will help reduces complications and risk to patients when given early i.e. post-operatively. Further, prospective studies with larger sample size are required to clarify exact dosages and duration of treatment for restricted bariatric surgery.

CONCLUSION

Vitamin D deficiency is highly prevalent among obese adults referred for bariatric surgery for the period. The decrease in percentage of deficiency in vitamin D in comparison to post-operative (i.e. 3-6 months follow-up) v/s. pre-operative suggests that active treatment of vitamin D by pre-operative assessment who would be required in patients undergoing

Table 1

				Pre-Op	3 Months	6 Months
	Age	Weight	BMI	Vitamin D	Vitamin D	Vitamin D
Mean	42.68	124.9	44.96	17.24	23.17	25.89
STDev	12.02	24.95	11.22	11.00	14.43	15.60

Table 2

	Vitamin D Pre- OP		Vitamin D 3 Months		Vitamin D 6 Months	
	<30	<10	<30	<10	<30	<10
Males	30.34%	8.99%	21.35%	6.74%	17.98%	2.25%
Females	28.45%	9.48%	28.45%	2.59%	20.69%	1.72%

Table 3

	Total	Percentage %
Males	89/205	(43.41%)
Females	116/205	(56.58%)

restrictive bariatric surgery is beneficial rather than routine post-operative supplementation. The result from the sample group supports that vitamin D supplements need to be given prior to surgery to increase absorption and decrease further patient risk. Further, prospective studies is required in Indian population, regional wise having more data to determine the optimal regimen or dose is required for vitamin D supplements prior to any planned restrictive bariatric surgery.

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Diagnostic Laparoscopy for Acute Abdomen in Emergencies

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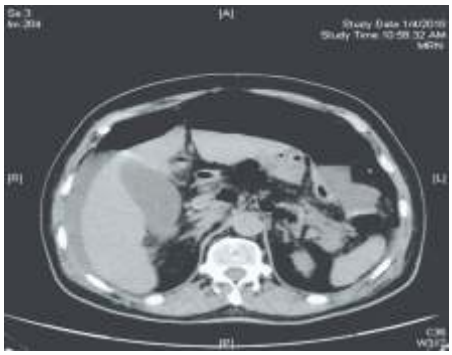
ABSTRACT

Diagnostic laparoscopy can be used to treat acute abdominal emergencies. It results in less morbidity of the patient and early recovery. Surgeons benefit from better visualisation of the organs especially in the pelvic area. We present a case of the urinary bladder perforation which presented as a case of acute abdomen following fall on edge of chair. Diagnostic laparoscopy was done in view of gas under diaphragm on contrast enhanced CT scan. Perforation was identified and repaired laparoscopically.

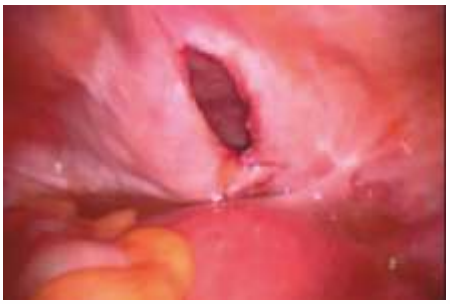
CASE REPORT

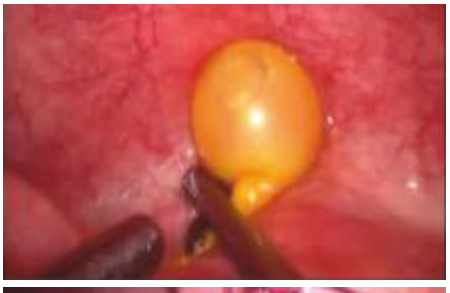
34 year female presented with complaints of severe pain abdomen after a fall on ground in a Saturday night party. She was brought to Max emergency within 6 hours. History and thorough clinical examination revealed tachycardia and generalised tenderness on abdominal examination. X-Ray plain picture abdomen did not reveal any free gas under diaphragm. Blood investigations revealed haemoglobin 14 gram % and Total Leucocyte Count 9800. Ultrasound abdomen was suggestive of minimal ascites. Her resuscitation was started in emergency with IV fluids. Foley's catheter was inserted to measure urine output. In this period, her pulse rate increased to 110 and abdominal signs aggravated, so urgent CECT abdomen was done which showed free gas under diaphragm. Patient was planned for emergency diagnostic laparoscopy.

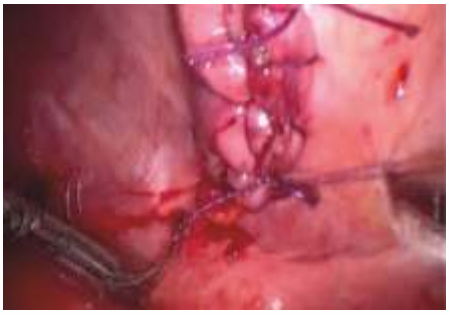


In diagnostic laparoscopy whole abdomen was scanned which revealed minimal ascites. Bowel loops were thoroughly checked but no perforation was found. On further evaluation with patient steep head down Inflamed serosa of urinary bladder was found which had a 1.5 x 1 cm rent in the anterior wall of urinary bladder. Foley's bulb could be seen inside. Bladder was repaired with 2-0 vicryl and thorough lavage of the peritoneal cavity was done under vision. Bladder perforation was due to trauma on lower abdominal wall after falling on edge of chair. The full bladder following party got ruptured after trauma.

Patient was discharged after 48 hours of hospital stay with Foley's catheter which was







removed after 2 weeks. Post-operative recovery of the patient was uneventful.

DISCUSSION

When laparoscopy started in late 1980's, it was the beginning of a new era. Less pain and lesser duration of stay in the hospital were some of the few benefits of laparoscopic surgery. As the scope of laparoscopic surgery increased from gall bladder and gynaecological surgeries to complex surgery of stomach, colon, oesophagus and solid organs, so did the need of surgery increase from elective to emergency settings[1]. Diagnostic laparoscopy can be done in blunt abdominal trauma to exclude any injury[2] and to surgically treat them if warranted. It should be seriously considered in patients with unyielding results from usual diagnostic procedures[2]. It gives a better visual field as compared to laparotomy for pelvic organs[3]. This was the advantage in our case as the bladder perforation was identified and dealt with laparoscopically, so morbidity of laparotomy was prevented.

CONCLUSION

Diagnostic laparoscopy helps to make accurate diagnosis in diagnostic dilemma of acute abdomen when conventional investigations fail to reach a definitive diagnosis. Apart from its value in making accurate diagnosis, it is also helpful in giving a definitive treatment to the patient. Patient benefits from the less pain, faster recovery and small scars and surgeon has the advantage of better visualisation.

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Introducing Heart Failure Clinic

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Dr. Kewal Krishan is a senior consultant cardiothoracic surgeon at Max Super Speciality Hospital Saket, New Delhi. He has done four years (2years each) advanced clinical fellowships at world's top hospitals including Mayo Clinic, Rochester MN, USA and Mount Sinai Medical center New York, USA where he gained expertise in advanced therapies. He was trained by internationally renowned surgeons for Heart Transplant and Ventricular Assist Devices.

Dr. Kewal is one of a handful surgeons in India who are formally trained in all aspects of thoracic transplantation including orthotopic and heterotopic heart transplantation. He was trained intensively in the entire spectrum of ventricular assist devices including bridge to transplant, short term and long term devices and destination therapy. He has many publications in international journals to his name in this field including innovative techniques in ventricular assist devices.

Introducing Heart Failure Clinic from surgical side with the aim to identify potential candidates for heart transplant and ventricular assist device.

The aim of heart failure clinic is an organised effort by heart failure experts to provide quality care for all those patients suffering from acute and chronic heart failure. The main aim of this program is to put efforts that will better serve these patients.

Heart failure is quickly becoming the most pressing health problem in India. Millions of people in India live with heart failure disease. In addition, there are numerous unreported cases. Even though there are good treatments that relieve symptoms and improve prognosis, not all get the treatment, they should. Heart Failure (HF) is a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of ventricles to pump blood.

Once medical therapy deemed failing or patients who had already undergone cardiac procedure and still symptomatic will get benefit from cardiac replacement therapy like heart transplant or ventricular assist device.

Main indications for cardiac replacement therapy are:

1. Progressive symptoms with maximal medical therapy.
2. Cardiogenic shock requiring mechanical assistance.
3. Refractory heart failure with continuous inotropic infusion.
4. NYHA functional class 3 and 4 with a poor 12 month prognosis.
5. Severe symptomatic cardiac problem not amenable to conventional surgical treatment.

At present time, cardiac transplantation remains the gold standard of cardiac replacement therapy. However, the supply of donor hearts is limited and therefore is not an option for many patients because of age and other comorbid conditions.

Alternative forms of cardiac replacement therapy are ventricular assist devices and total artificial heart. Although heart transplant never subjected to a randomized control trial, heart transplantation is the therapy for advanced heart failure observationally associated with an excellent survival. Advances in close follow-up and newer immuno-suppression have led to improvement in 1 year survival is 90 to 95%. Our integrated team approach will provide comprehensive care to the people who need heart transplant or ventricular assist device.

Our mission is to enhance quality and duration of life in those with heart failure.

Figure 1: Ventricular Assist Device

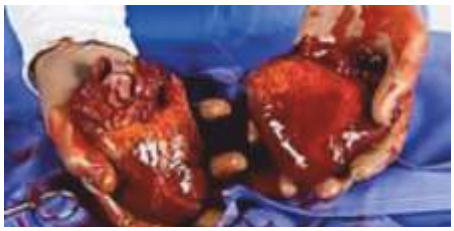

Figure 2: Heart Transplant

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Swift Restoration of Functional Swallow Using NMES during Hospital Stay in Acute Cerebral Stroke Patients

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INTRODUCTION

Globally, stroke is an epidemic that threatens lives, health, and quality of life. It is one of the leading causes of death and disability in India. The estimated adjusted prevalence rate of stroke is 84-262/100,000 in rural and 334-424/100,000 in urban areas. The incidence rate is 119-145/100,000 based on the recent population based studies[1].

Dysphagia has been proven to be an independent predictor of morbidity and mortality in stroke patients[2,3]. It has been observed in approx. 45-65% of individuals who have had an acute stroke. The manifestation, severity and prognosis of dysphagia are greatly affected by the locus and size of neurological damage[4]. Stroke disrupts the normal physiology of swallowing leaving the airway vulnerable to the entry of food in to the lungs causing aspiration. If not treated or resolved, it may take a more protracted course and may lead to serious complications, such as pneumonia, malnutrition, dehydration and death[4]. Pneumonia accounts for approx. 34% of all stroke-related deaths and is the third highest cause of death during the first month after stroke owing to affected cognition, poor cough and swallow reflex etc[5,6,7].

The incidence of dysphagia though high, may resolve within 2-3 weeks of onset of stroke, but a recovery is not assured and complications may occur[8, 9]. The same cannot be held true about brainstem strokes as they are less common amounting to only 15-25% of all strokes and result in the largest swallowing compromise[9, 10]. Limited evidence is available with regard to dysphagia management and its recovery duration post brainstem stroke. Literature states that dysphagia following brainstem stroke, esp. Lateral Medullary stroke, may persist for a life time or may take months or years to resolve[2, 11, 12].

To ensure early and effective dysphagia recovery, combined Traditional Dysphagia Therapy (TDT) and Neuro Muscular Electrical Stimulation (NMES) have been widely accepted in cases of stroke [13, 14, 15, 16]. However, the patients included in these studies mostly had cerebral stroke[2, 5]. Cerebral lesions interrupt oromotor control and pharyngeal peristalsis, also causing impairments in cognitive functions such as concentration or selective attention[10]. Traditional dysphagia therapy constitutes thermal-tactile stimulation, dietary texture modification, strengthening of oropharyngeal musculature, compensatory manoeuvres to facilitate laryngeal elevation and closure during swallowing[4,5,14,17].

NMES has been postulated to improve hyolaryngeal elevation, restore motor function of weak muscles, combat disuse atrophy, enhance sensory awareness, and facilitate muscle contraction[4,6]. Not only does NMES prove efficacious in recuperating dysphagia, but also as an early intervention to evade complications. Such recovery has been attributed to the reorganization of the unaffected motor cortex. The excitability of the cortical projection to swallowing muscles can be influenced by stimulation of afferent fibres in the vagus and trigeminal nerves via sensory input from the gut and NMES of the pharynx. This could be a potential mechanism to hasten the recovery of function from the intact representation in the undamaged hemisphere[4,18].

A scenario observed in most hospital-based settings as a criterion for discharge is a stable medical condition, which may not warrant a functional swallowing status[19]. As a result, the patients are discharged with alternate feeding methods like Naso Gastric Tube (NGT) or Percutaneous Endoscopic Gastrostomy (PEG) tube to fulfil the nutritional demands. Moreover, an elaborate process begins constituting an added expense of management of tube feeding, risk of respiratory tract infections, and a further delay in achieving functional swallow[20]. This mandates the need to depict a duration which allows recovery from dysphagia in acute cerebral stroke patients within hospital stay, if possible. Therefore, an effort was made in the current study to apply NMES along with TDT for swift recovery from dysphagia during hospital stay in acute cerebral stroke patients.

METHODOLOGY

Between July 2011 and June 2013, screening for dysphagia was performed on the patients with acute cerebral stroke by a dysphagia therapist. Out of the 110 patients screened, twenty two hemodynamically stable patients were included in the study based on selection criteria. All subjects had oropharyngeal or pharyngeal dysphagia and were receiving nutrition through alternative feeding modes (e.g. NGT or PEG tube).

SELECTION CRITERIA

Inclusion Criteria

- Age 18 years and above
- Both sexes
- Primary diagnosis of cerebral stroke confirmed by computed tomography or magnetic resonance imaging
- National Institute of Health Stroke Scale (NIHSS) conscious level score=0
- American Speech and Hearing Association (ASHA) National Outcome Measurement System (NOMS) level ≤ 3 (Alternative method of feeding is required as individual takes less than 50% of nutrition and hydration by mouth, and/or swallowing is safe with consistent use of moderate cues to use compensatory strategies and/or requires maximum diet restriction) based on clinical bedside swallow assessment

Exclusion Criteria

- History of dysphagia prior to stroke
- Psychiatric disorders
- Co morbidities which may lead to dysphagia
- Patients on ventilator
- Tracheostomized patients

PROTOCOL

A validated reliable Clinical Bedside Evaluation (CBE) of swallowing was used for screening patients. It included a detailed history of the subjective complaints and medical status, cranial nerve testing, and an examination of the phases of swallowing along with food trial of different consistencies. Cervical auscultation, respiratory status examination, and pulse oximeter monitoring were also done [1, 20, 21]. Based on CBE, ASHA NOMS and Swallow Function Scoring (SFS) system levels were obtained. The selected patients were introduced to the concept of TDT and NMES (Vital Stim). TDT included dietary texture modification, oropharyngeal exercises, thermal-tactile stimulation, and compensatory manoeuvres. The treatment sessions included 60 minutes of Vital Stim therapy combined with custom-made TDT every day till they were discharged or reached ASHA NOMS level 6. Electrical stimulation was delivered with a dual-channel electrotherapy system with pulsed current at a fixed pulse rate of 80 Hz and pulse duration of 700 micro seconds (Vital Stim Experia Model). An occupational therapist certified in the use of Vital Stim therapy provided the treatment.

Placement of Electrodes: Before placing the electrodes, an alcohol pad was used on the skin of the anterior part of the neck of each patient to remove any substance that might interfere with electrode contact. In channel 1, both the electrodes were aligned horizontally above the hyoid bone. In channel 2, both electrodes were aligned horizontally at or above the level of thyroid notch on either side of midline.

Rationale: This orientation causes the electricity to flow in the muscles that are aligned in a horizontal direction. The superior electrodes give good facilitation of hyolaryngeal excursion by their action on the anterior belly of the digastric and the myohyoid, while the inferior electrodes facilitate thyrohyoid approximation. The current may also, at sufficient intensity, facilitate pharyngeal constriction.

Setting Amplitude for NMES: After positioning the electrodes, electrical stimulation was introduced and increased gradually to reach the initial stimulation amplitude for treatment. Three ways to determine this are- a grabbing sensation reported by the patient, palpation or visual identification of muscle contraction, and /or presence of voice change or an audible swallow. A "stimulating ruler" system was provided to the patients demonstrating difficulty with verbal expression to indicate when the grabbing sensation had been achieved. A commonly used pain ruler was modified as a "stimulation ruler" on which faces were used to indicate different levels of intensity of stimulus. The target level of stimulation was associated with a smiling face. During sessions, patients were asked to indicate at regular intervals whether the grabbing sensation fell below the optimal sensory response. If this occurred, the stimulation was increased until the patient indicated optimal stimulation amplitude was attained.

Each patient was acquainted with the equipment and procedures to be used. The baseline amplitude for electrical stimulation was established. All swallow attempts were completed under active electrical stimulation. The swallowing strategy included keeping bolus in the mouth, closing the mouth and breathing through the nose, and then swallowing hard and fast in a single attempt.

Outcome Measures:

- ASHA NOMS [19, 22, 23]: It is a multidimensional toll designed to measure both the supervision level required and diet level by assigning a simple number between 1 and 7 (appendix 1)
- SFS [5, 24]: It has been validated as a 7-point scale that describes the severity of swallowing function (appendix 2)

Performance Monitoring: After appropriate intensity of NMES was set, custom-made TDT was given which consisted of breathing exercises, oropharyngeal exercises, repeated swallow using thermal and tactile stimulating activities and feeding training with appropriate food group based on SFS level.

Everyday feeding training was provided with NMES which was reviewed in each session to introduce the next food consistency. As the SFS level progressed, up gradation of diet group was done and the patient was advised to consume the same diet group two to three times a day. With the progression of oral diet, tube feeding was gradually tapered off and if the patients reached ASHA NOMS level 5 (swallow is safe with minimal diet restriction and/or occasionally requires minimal cueing to use compensatory strategies; may occasionally self cue; all nutrition and hydration needs are met by mouth at mealtime). In order to meet nutritional demands, dietary modifications in the form of thin liquids were provided (SFS level 5- appendix 2). Also, the patients were meant to follow general aspiration precautions e.g. use of an upright feeding position, which was to be maintained for 15-20 minutes after the meal; liquids to be given in sips; presentation of small bolus of food etc. The alternative method of feeding was removed. The number of sessions for each patient at the time of discharge was recorded following which treatment was discontinued or if a patient reached ASHA NOMS level 6 before discharge.

Statistical analysis was done using SPSS for Windows, version 13.0. The confidence interval was taken as $p<0.05$. The comparison of pre intervention ASHA NOMS mean score to post intervention mean score as well as for pre and post SFS mean score was done using paired T-test. Also, correlation studies were done using Pearson's Correlation Coefficient (r) between:

- Pre ASHA NOMS and pre SFS scores
- Post ASHA NOMS and post SFS scores
- Age and number of sessions
- Pre ASHA and number of sessions
- Pre SFS and number of sessions

RESULTS & DATA ANALYSIS

Out of the 22 acute cerebral stroke patients in the present study, 18 were male and 4 were female. The mean age of the patients was 69.9 ± 11.58. 16 of the patients had a left sided lesion whereas 6 had right sided lesion. Out of these, the ratio of haemorrhage versus infarct was 7:15. On an average, the patients took 8 days to reach NIHSS conscious level score=0 after onset of stroke when the CBE was conducted followed by dysphagia intervention. The mean of pre-intervention ASHA NOMS scores was 1.86 which was categorized as severe dysphagia (≤3). The demographic characteristics of the patients are shown in table 1.

The mean number of sessions of combined NMES and TDT intervention for dysphagia within hospital stay of acute cerebral stroke patients was found to be 7.59 ± 5.69.

Table 1

Age (mean in years)		69.9 ± 11.58
Sex	Male Female	18 4
Side of lesion	Left Right	16 6
Type	Haemorrhage Infarct	7 15
Baseline NOMS ASHA(mean) Baseline SFS (mean)		1.86 ± 0.71 1.5 ± 0.80
Duration to achieve NIHSS conscious level score =0 (since stroke onset) (mean in days)		8 ± 7.4

Table 2 shows the comparison of mean scores of Pre-ASHA NOMS compared with Post ASHA NOMS as well as comparison of mean scores of Pre-SFS with Post-SFS.

The results indicate an extremely statistically significant result in both comparisons using paired t-test.

Table 2

	ASHA	SFS
Pre intervention mean	1.86 ± 0.71	1.5 ± 0.80
Post intervention mean	4.77 ± 1.19	4.14 ±1.42
T-test value	12.306	9.566
Degrees of freedom (df)	21	21
P-value	<0.0001	<0.0001

Graph 1 shows comparison of pre and post mean scores of ASHA NOMS and SFS, respectively.

Table 3 shows the correlations between variables using Pearson's correlation coefficient (r)

Table 3

Variable 1	Variable 2	Correlation coefficient (r)	Correlation
Age	No of sessions	-0.1294	Weak
Pre ASHA	Pre SFS	0.8119	Strong positive
Post ASHA	Post SFS	0.947	Strong positive
Pre-ASHA	No of sessions	-0.556	Moderate negative
Pre- SFS	No of sessions	-0.6308	Moderate negative

Graph 2 shows the percentage of individuals with or without alternate feeding method. Alternate feeding (NGT or PEG tube) was removed in 73% of patients post intervention which corresponds to ASHA NOMS level ≥ 5.

DISCUSSION

The present study delineates that an early application of combined NMES and TDT potentiates swift restoration of swallow function in acute cerebral stroke patients with dysphagia in nearly 7 sessions (mean 7.59 ± 5.69).

Technologic advances like Vital Stim therapy, Transcranial Magnetic Stimulation (TMS), and Functional Magnetic Stimulation (FMS) have enhanced the assessment and treatment of patients with dysphagia by permitting better quantification of impairment and treatment effectiveness[8,9,25].

Swallowing is modulated by sensory input from mouth and pharynx. The asynchronous firing of motor units within oropharyngeal musculature is mandatory for a safe swallow. This may be disrupted secondary to a cerebral stroke. Also, recovery over a prolonged period may result in disuse of striated muscles leading to atrophy [5, 6]. NMES coupled with TDT enhanced functional swallow as was evident in comparison of ASHA NOMS scores pre to post- intervention, which were statistically significant ($p < 0.0001$, Table 2). The mean score drawing near 5 post-intervention implicates safe swallowing with dietary modifications and removal of alternate feeding method (in 73% patients, graph 2). These findings are congruent with earlier literature[4,5,26], although none of the studies emphasized the number of dysphagia therapy sessions (combined NMEs and TDT) required to facilitate functional swallow.

NGT or PEG tube is provided for non-oral nutrition as a method of choice, esp. in severe dysphagia. However, evidence states that it is not completely effective in preventing aspiration pneumonia as non-oral feeding does not prevent patients from aspirating their own secretions. Not only is the extent of disability and cognitive impairments more severe with tube feeding but also the incidence of aspiration pneumonia has been found to be 5.5 times higher than the rate of dysphagic patients receiving modified diets[20,27,28].

In the present study, the patients had an ASHA NOMS score 3 or less pre-intervention reflecting the need to provide an alternate mode of feeding like NGT or PEG. The mean number of dysphagia therapy sessions i.e. 7.59, as opposed to 2-3 weeks of spontaneous recovery without intervention (which may not be warranted), confirmed a functional swallow eliminating the requirement of alternate feeding at an early stage, thus, preventing secondary complications like aspiration pneumonia, malnutrition, dehydration etc. This measure would be relevant in developing countries like India, as use of alternate feeding method places extra demands on a stretched health care budget[19]. However, 6 of the patients (27%) were discharged on tube feeding before achieving ASHA NOMS score of 5 owing to stable clinical condition and cost issues as a criterion. All patients who were discharged before reaching ASHA NOMS level 6 were advised to follow up as an out-patient for continuation of NMES intervention and were provided TDT home programme.

Our study shows that the variable of age does not seem to interfere much with the resolution of dysphagia [19]. This signifies that resolution of dysphagia could be influenced by initial swallowing status as determined by ASHA NOMS. Lower the ASHA NOMS score, longer is the duration of management (moderate negative correlation, $r = -0.556$, Table 3)[19].

Based on our results, it can be proposed that the earlier oral feeding is introduced, higher the probability of reaching good dysphagia outcomes[19]. Not only were results statistically significant for functional swallow (ASHA NOMS), but also there was a favourable progression of food consistency as shown by SFS scores ($p < 0.0001$, Table 2). Most patients advanced from as severe a state of SFS score 0 or 1 i.e. chances of saliva aspiration to nectar consistency or thin liquids. Even so, the pre-intervention SFS score is determinant of number of sessions required (moderate negative correlation, $r = -0.6308$, Table 3).

A crucial pre-requisite to establish safe swallow is an early evaluation of dysphagia. Moreover, early intervention to provide swift restoration of swallow function with subsequent removal of alternate feeding within hospital stay in acute cerebral stroke patients was highlighted in our study. ASHA NOMS and SFS conform to the standards of clinical dysphagia evaluation in providing information on safe swallow function and in addition are the predictors of duration of management. It can also be concluded that ASHA and SFS scores progress simultaneously with intervention ensuring not only safe functional swallow but a good progression of food consistencies as well (strong positive correlation, Table 3). This necessitates an early referral by doctors and other health care professionals in order to reduce the burden of alternate feeding as soon as possible to avoid extra expenditure and complications like disuse atrophy, aspiration pneumonia, upper respiratory tract infections etc.

Certain limitations were found in the study. Firstly, an objective swallowing evaluation like Video Fluoro Scopy (VFS) was not part of the study. However, clinical bedside evaluation has been proven to have a good diagnostic sensitivity[19]. It may be considered that VFS, being a gold standard to study oral and pharyngeal mechanisms of dysphagia and aspiration, is not feasible to perform on every patient owing to factors like age, cost, entails radiation exposure etc[2,18,19,20]. Secondly, follow up of the patients after discharge was not included in the study, though a home programme was provided to each patient. Thirdly, the results could not be generalized due to small sample size. As mentioned earlier, 110 patients with acute cerebral stroke were screened for dysphagia out of which only 22 had severe dysphagia (ASHA NOMS ≤ 3). Lastly, no control group was included in the study.

CONCLUSION

Early dysphagia intervention using NMES combined with TDT was found to bring about swift restoration of safe swallow function in acute cerebral stroke patients as it is imperative to reduce the burden of tube feeding as well as reduce the life-threatening complications arising from it.

FUTURE RESEARCH

The results of our study emphasize swift recovery from dysphagia in acute cerebral stroke patients. However, the incidence of dysphagia depends on the location and size of lesion, thereby, entailing a need to study effects of intervention in subtypes of cerebral stroke along with comparison of difference in the incidence and recovery of dysphagia between left and right cerebral lesions.

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THE TIMES OF INDIA

Social Media Strategy Review THE TIMES OF INDIA

Iraqi girl with shrunken face smiles after surgery

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New Delhi: A 14-year-old Iraqi girl disfigured by a rare disease that caused shrinking of the face on the left side had her face reconstructed at a private hospital here. Doctors at Max Hospital, Saket, where the surgery took place, said they used tissues from the thigh to correct the deformity—a deeply sunken cheek along with a disfigured forehead and chin.

"Before the surgery, Athra looked like a 6-year-old girl from the left side. The height, width and even the volume of the face had reduced by one-third due to an autoimmune disorder, Parry-Romberg Syndrome," said Dr Sunil Choudhary, director of aesthetic and reconstructive surgery at Max Super Specialty Hospital. He said it took eight hours to conduct the procedure, which involved transplanting tissues from one part of the body to another that's missing some.

"It was like a half-face transplant. The challenge was to give the deformity a shape that makes the girl look better. We somehow succeeded in our endeavour," added Dr Choudhary, who led the surgery. He was assisted by two other plastic surgeons, Dr Prateek Arora and Dr Raghav Mantri.

A three dimensional CT scan was first taken to measure the deficiency in terms of volume, on the deformed side. Then the doctors used a wax mould—normally used to carve out the exact form of denture—to assess the dimension of graft needed for transplant.

Doctors said tissues from the thigh were used to correct the deformity—a deeply sunken cheek along with a disfigured forehead and chin

"In the US and other developed countries, surgeons use CT scan images to design fat graft created by a 3D printer. Since that is very costly, we have developed an affordable method for crafting the face," said Dr Choudhary.

According to the plastic surgeon, the dissected tissue from the thigh region was transplanted on the face using specialized operating microscopes and precision instruments.

"When the girl came to our hospital, she would not lift the hijab from her face. She was sad and apprehensive about the reaction from others. It's only been a week since she was operated upon but there's a smile on her face," said Dr Choudhary.

He, however, added that facial reconstructions for patients suffering from diseases like the Parry Romberg syndrome can only be done when the disease is not progressive. "Usually, the shrinking of face stops at a particular age. In Athra's case, the shrinking started when she was four years old but it stopped as she turned 13. So we could operate on her," the doctor said.

*Source - Social Media

WELCOME TO THE TEAM

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EXPERIENCE

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ACCOMPLISHMENTS / AWARDS

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