Cardio Mag

Volume 1|Issue 1|2020

Dear Doctor,
*Greetings from Micro Labs Limited. We are happy to bring you "**Cardio Mag**", which contains latest and interesting news in the field of Cardiology.*

This issue contains

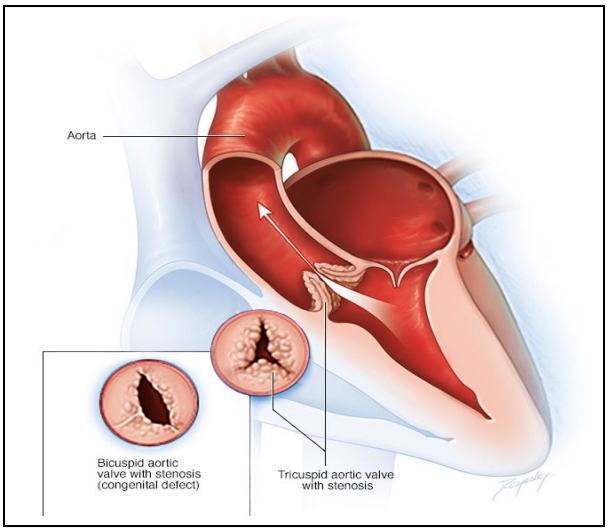
- ***Role of low dose Tolvaptan in patients with decompensated heart failure in severe aortic stenosis***
- ***A case of COVID19 with cardiac involvement***
- ***X-ray Free Cath Lab Imaging to Replace or Supplement Angiography: FORS technology***

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback.
Best Regards,
Medical Team, Micro Labs Limited

Role of low dose Tolvaptan in patients with decompensated heart failure in severe aortic stenosis

Development of congestive heart failure (HF) in patients with severe aortic stenosis is associated with major morbidity unless aortic valve replacement (AVR) is performed. However, in some patients with decompensated HF, due to multiple coexisting disorders they are unable to receive surgical intervention for AS.



The treatment goal in HF patients with severe AS is to decrease preload and afterload. However, diuretic responses to existing natriuretics are limited due to a relatively fixed outflow obstruction and delayed recovery from hypotension. Even though loop diuretics are first choice, the intravascular volume depletion alone may be dangerous leading to systemic hypotension, even if transient.

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Tolvaptan, an oral selective V2 receptor antagonist increases net volume loss and improves symptomatic congestion by excretion of free water into urine, maintaining hemodynamics and renal function even in patients with HF.

Methods:

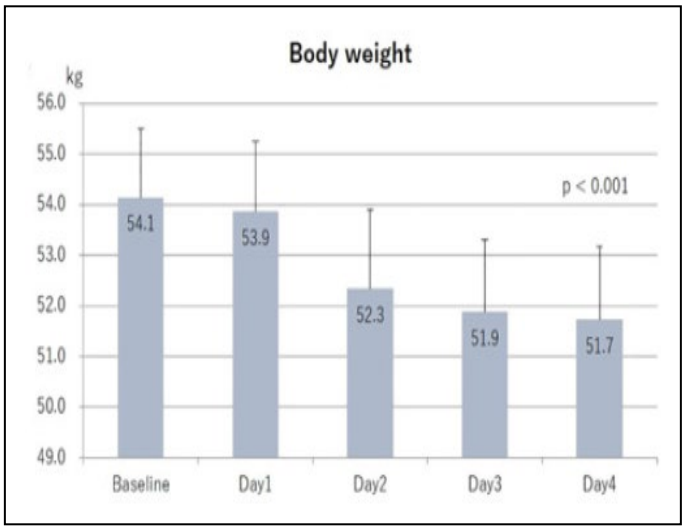
Low-Dose Tolvaptan in Decompensated Heart Failure Patients with Severe Aortic Stenosis (LOHAS) registry is a multicentric prospective study involving 59 patients hospitalized for acute decompensated HF and severe AS.

Acute decompensated HF with severe AS (aortic valve area < 1.0 cm^2) were included in the study.

Patients were started with 7.5 mg of Tolvaptan. They also received all clinically indicated HF therapies including diuretics.

Some of them received mechanical intervention for AS including balloon aortic valvuloplasty, transcatheter aortic valve implantation , or AVR during treatment.

The primary endpoints were change in bodyweight between admission and day 4 and change in fluid balance measured daily from baseline up to day 4. Secondary endpoints included change in urine volume, blood pressure , heart rate (HR), and fluid retention as cardiothoracic ratio on chest radiography, daily from baseline up to day 4.



Results:

A significant improvement in body weight was seen in patients treated with Tolvaptan on day 4 from baseline .($p<0.001$) as shown in figure. Tolvaptan was well tolerated even in elderly patients.

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Improvement in other parameters is shown in table 1.

Variable	Baseline	Day 4	p-Value
Patient number, n	59	57	
Orthopnea	54 (91.5%)	9 (15.3%)	<0.001
Peripheral edema	47 (79.7%)	21 (35.6)	<0.001
Jugular venous distension	45 (76.3%)	18 (30.5%)	<0.001
Pleural effusion	47 (79.7%)	36 (61.0%)	0.049
Lung edema	53 (89.8%)	24 (40.7%)	<0.001
Cardiothoracic ratio (chest radiograph), %	61.7 [58.1–65.3]	59.4 [55.2–63.6]	<0.001
Atrial fibrillation	20 (33.9%)	18 (30.5%)	0.790
Proteinuria			0.011
1+	9 (15.3%)	6 (10.2%)	
2+	6 (10.2%)	4 (6.8%)	
3+	2 (3.4%)	1 (1.7%)	
Serum creatinine, mg/dL	1.07 [1.03–1.11]	1.07 [0.71–1.41]	0.321
Cystatin C, mg/L	1.35 [1.02–1.68]	1.49 [1.09–1.89]	0.014
eGFR (mL/min/1.73 m^2)	36.5 [21.6–51.4]	36.0 [24.7–47.3]	0.066
Serum sodium, mEq/L	140 [138–142]	143 [141–145]	<0.001
BNP, pg/mL	910.5 [429.5–1391.0]	740.0 [200.0–1280.0]	0.002

Values are expressed as n (%) or as median [IQR]. BNP, B-type natriuretic peptide; eGFR, estimated glomerular filtration rate.

Discussion:

In treating HF with severe AS, focus is mainly on relieving stenosis, however medical treatment for HF with severe AS has been not satisfactory. Loop diuretics cause electrolyte imbalance, activation of renin that is detrimental. Tolvaptan is an oral selective V2 receptor antagonist , which increases net volume loss in patients with HF without adversely affecting hemodynamics.

Few pilot studies demonstrated the efficacy and safety of Tolvaptan treatment in patients with HF and severe AS. This study showed that Tolvaptan significantly increased urine output, reduced body weight, improved symptoms with low incidence of hypernatraemia and also

improved serum BNP levels without affecting blood pressure, heart rate, and renal function also in elderly patients with severe AS.

Transcatheter aortic valve implantation (TAVI) has evolved as a mainstream therapy for treating patients with severe symptomatic AS. Tolvaptan is useful as a bridge therapy for TAVI and other mechanical interventions for severe AS.

Conclusion:

Low -dose tolvaptan is effective and well tolerated with stable haemodynamics for shorter duration in acute decompensated HF with severe Aortic Stenosis

References:

1) *Watanabe Y et al. Short-term effects of low-dose tolvaptan in acute decompensated heart failure patients with severe aortic stenosis: The LOHAS registry. Int J Cardiol. 2020;305:82–86.*

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A case of COVID19 with cardiac involvement

First of coronavirus disease 2019 (COVID-19) was reported in December 2019 in Wuhan, China. It has rapidly spread and has become a public health emergency of international concern. Data regarding cardiovascular involvement due to SARSCoV2 infection is less studied. Severe acute respiratory syndrome(SARS) belonging to beta-coronavirus infections was associated with tachyarrhythmias and heart failure.

The current case study describes the involvement of cardiac involvement in COVID 19 patient.

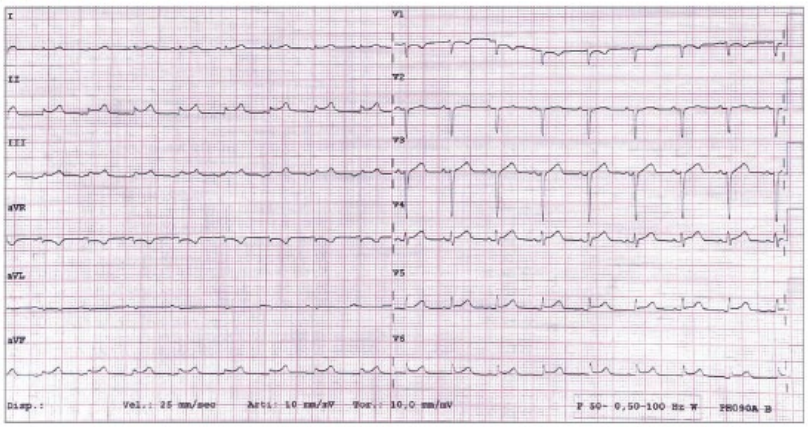
Case report:

A healthy 50 year old woman without previous cardiovascular disease presents with chest pain dyspnea, with history of fatigue since 2 days and fever , cough since 1week.

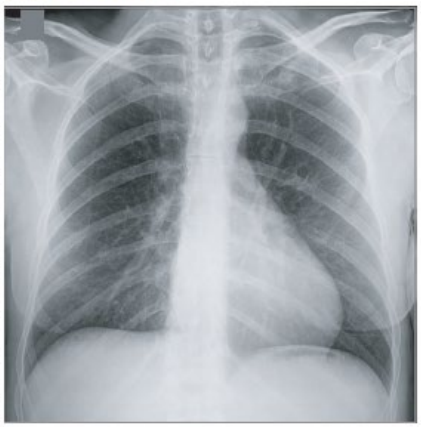
On examination , BP was found to be 92/54 mm hg, with tachycardia of around 104 beats per minute, oxygen saturation was 98 % and body temperature of 36.8 degree. Arterial blood gas analysis showed a pH of 7.48, partial pressure of oxygen 80 mm of Hg and carbon dioxide partial pressure of 35 mm Hg, lactate level of 17.3.

A 12 lead ECG revealed low voltage complexes with minimal diffuse ST elevation in inferolateral leads and T wave inversion with ST depression in lead I , aVR. Chest X ray findings were not remarkable, as shown in figure.

A Electrocardiography



B Chest radiography



Blood tests revealed elevated levels of markers of myocyte necrosis (high-sensitivity troponin T level of 0.29 ng/mL and creatine kinase–MB level of 23.3 ng/mL, elevated N-terminal pro–brain natriuretic peptide (NT-proBNP) levels (5650 pg/mL slight increase in C-reactive protein levels (1.6 mg/dL , hyperkalemia, hyponatremia, and hypochloremia with normal blood cell counts.

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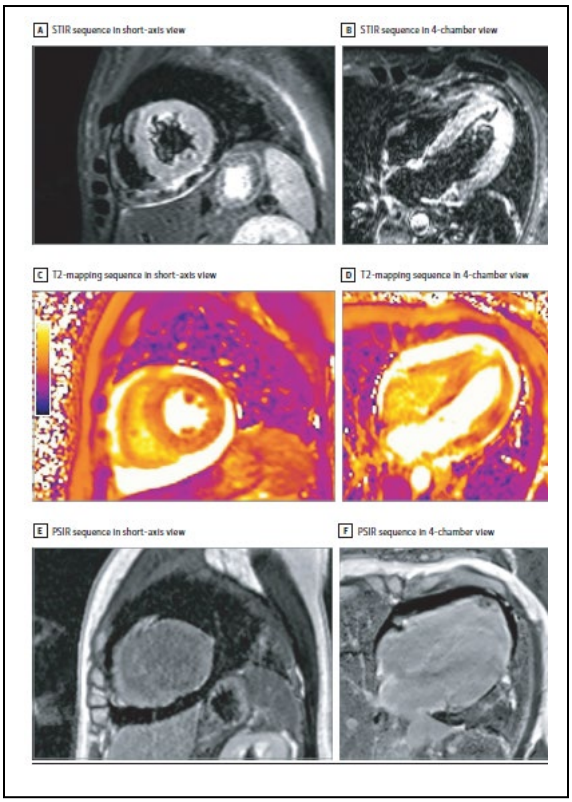
Echocardiography showed regional wall motion abnormalities, Coronary angiography was done which showed no obstruction coronary arteries.

A nasopharyngeal swab was performed with a positive result for SARS-CoV-2 on real-time reverse transcriptase– polymerase chain reaction assay. Patient was admitted with suspected myopericarditis.

Transthoracic echocardiography showed normal left ventricular (LV) dimensions with an increased wall thickness (interventricular septum, 14 mm, posterior wall, 14 mm) and a diffuse echo-bright appearance of the myocardium. Diffuse hypokinesis, with an LV ejection fraction (LVEF) of 40%. no evidence of heart valve disease. Left ventricular diastolic function was mildly impaired with mitral inflow patterns, with an E/A ratio of 0.7 and an average E/e' ratio of 12. A circumferential pericardial effusion was notable around the right cardiac chambers (maximum, 11mm) without signs of tamponade.



Cardiac MRI confirmed the increased wall thickness with diffuse biventricular hypokinesis, especially in the apical segments, and severe LV dysfunction (LVEF 35%). Short tau inversion recovery and T2-mapping sequences showed marked biventricular myocardial interstitial edema. Phase-sensitive inversion recovery sequences showed diffuse late gadolinium enhancement extended to the entire biventricular wall.

Dyselectrolytaemia was treated with kayexalate, glucose and insulin solution, and sodium bicarbonate. Patient remained hypotensive and required inotropic support with dobutamine in the first 48 hours, during this period there was a further increase in levels of NT-proBNP (8468 pg/mL), high-sensitivity troponin T (0.62ng/mL), and creatine kinase–MB (39.9 ng/mL),with a progressive stabilization and reduction during the following days.

Blood pressure progressively got stabilized, although systolic pressure remained less than 100 mm Hg, and dobutamine was tapered on day 4. Treatment for heart failure was started with 50mg of kanrenone,25 to 50mg of furosemide, and 2.5mg of bisoprolol, then reduced and finally withdrawn on day 5 owing to sinus bradycardia. Patient was treated with intravenous aspirin (500mg twice daily), hydroxychloroquine (200mg twice daily), lopinavir/ritonavir (2 tablets of 200/50 mg twice daily), and intravenous methylprednisolone (1mg/kg daily for 3 days) were administrated. Follow up Transthoracic echocardiography on day 6 revealed a significant reduction of LV wall thickness (interventricular septum,

11mm; posterior wall, 10 mm), an improvement of LVEF to 44%, and a slight decrease of pericardial effusion (maximum, 8-9 mm).

Discussion:

Virus infection is one of the most common cause of myocarditis. Focal myocarditis is suspected in patients presenting with chest pain after an influenza like syndrome, with evidence suggesting an acute coronary syndrome.

Possible mechanism is SARS-CoV-2 could trigger an exaggerated inflammatory response that can cause myocardial injury, supported by increase in cardiac troponin levels , MRI findings showing diffuse edema, and the slow gadolinium washout are in line with and this is justified with the use of corticosteroids to attenuate inflammation in the present case.

Conclusion: A case of COVID 19 reported with a possible acute myocarditis , which resolved with anti-inflammatory and improved with heart failure medication.

Reference: Inciardi RM et al. Cardiac Involvement in a Patient With Coronavirus Disease 2019 (COVID-19). JAMA Cardiol. Mar 2020 : e1-e6.

X-ray Free Cath Lab Imaging to Replace or Supplement Angiography: FORS technology

As X ray radiation exposure is a concern in cath labs, to replace the current X-ray fluoroscopy, a new technology called FORS technology helps in overcoming it.

Fiber Optic Real Shape (FORS) technology creates real 3-D imaging of anatomy and devices present inside the body using light, rather than X-rays.

FORS technology works by using light traveling through hair-thin optic fiber inside special FORS enabled catheter and guidewires. This is on the concept of measuring strain in the optical fibers, using light that is reflected from density fluctuations in optic fibers. The the location of the wires is superimposed on 3-D anatomical imaging.

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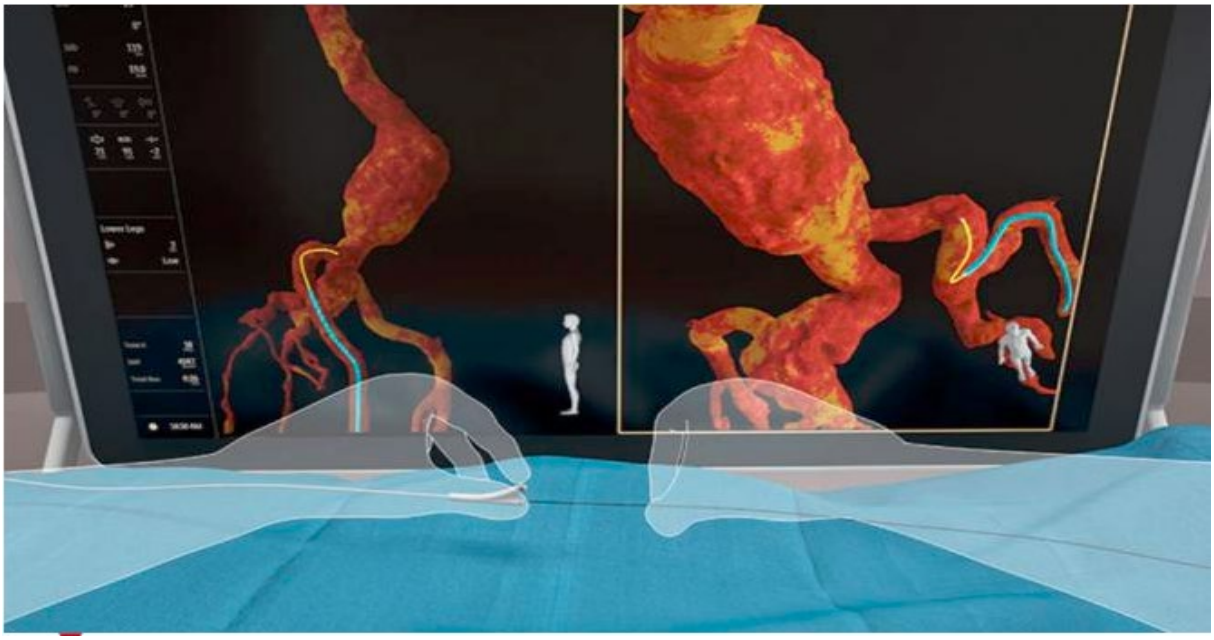

The technology exhibits the full shape of devices in 3-D, in real-time and also in distinctive colors, in multiple, controlled by users, viewing angles unrestrictedly in context of the patient's anatomy. It uses overlays from pre-operative 3-D anatomical data from computed tomography (CT), magnetic resonance imaging (MRI), or intra-operative rotational angiographic X-ray imaging. This technology also helps in real-time 3-D visualization of devices inside the body without the need for fluoroscopy.

The technology has European CE mark clearance . A study was done on humans in Netherlands for endovascular aortic repair (EVAR) and illiac or superficial femoral artery PTA peripheral angioplasty procedures. The study enrolled 21 patients, investigators graded FORS image guidance as "better than standard guidance" in 16 (76%) cases and "on par with standard guidance" in five (24%) cases.

Reference:

Available at https://www.dicardiology.com/article/philips-developing-x-ray-free-cath-lab-imaging-replace-or-supplement-angiography. Accessed on 29-03-2020