CASE REPORT

An Unusual Presentation of Tetralogy of Fallot in a Dog: A Case Report

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Tetralogy of Fallot (ToF) is a complex congenital cardiac anomaly characterized by four main defects: a ventricular septal defect (VSD), obstruction of the right ventricular outflow tract (RVOT) usually associated with pulmonary stenosis (PS), dextroposition (overriding) of the aortic root, and secondary right ventricular hypertrophy (Boon, 2011; Beijerink *et al.,* 2017). It represents the most common cyanotic congenital heart defect in dogs and cats, with a reported prevalence ranging from 0.6% to 6.9% of all congenital cardiac anomalies in these species (Oliveira *et al.,* 2011; Beijerink *et al.,* 2017). Breeds reported to have a predisposition for this condition include the Keeshond, English Bulldog, Miniature Poodle, and several Terrier-type breeds (Strickland and Oyama, 2016). The condition shows considerable variation in presentation and anatomical features. Chronic pressure overload further leads to right ventricular concentric hypertrophy. The systemic delivery of deoxygenated blood is responsible for the hallmark clinical manifestation of cyanosis (Chetboul *et al.,* 2016). In some animals, ToF can remain clinically silent for several years before signs become apparent. However, the majority of affected dogs exhibit marked exercise intolerance and cyanosis, with sudden death being a frequent outcome in this group of patients (Beijerink *et al.,* 2017). This case report underscores the atypical presentation of this congenital disorder that became evident in an adult dog despite years of an apparently normal clinical status.

Case History and Observations

A 4-year-old intact male American Pitbull Terrier, weighing 28 kg, was presented at Small Animal Multi-Speciality Veterinary Hospital, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) with a history of exercise intolerance and weakness for the last 3 months. The dog was reported to be eating, drinking, and behaving normally, with no history of medication use. On examination, the patient was bright, alert and responsive, with a good body condition (body condition score 3/5), rectal temperature was 102°F, heart rate was 140 beats/min, and pulses were strong and synchronous. Respiratory assessment revealed panting with a shallow breathing pattern. Mucous membranes appeared pink with a capillary refill time of less than 2 seconds. Cardiac auscultation revealed a grade V/VI systolic murmur, most prominent at the left heart base and a grade IV/VI systolic murmur on the right side. Haematology was normal but biochemical findings were mildly altered from normal ranges (Table 1).

Table 1: Haemato-biochemical parameters of the dog with Tetralogy of Fallot

Parameter	Dog with ToF	Reference range (Dabhi *et al.,* 2009)
Haemoglobin (g/dL)	14.9	12-18
TLC ($\times10^3$/µL)	10600	6000-17000
Neutrophils (%)	85	60-77
Lymphocytes (%)	15	12-30
TEC ($\times10^6$/µL)	5.82	5.5-8.5
Packed Cell Volume (%)	45	37-55
Platelet count ($\times10^3$/µL)	289	200-500
ALT (IU/L)	95	8.2-57
AST (IU/L)	142	8.2-49
Total Protein (g/dL)	7.1	5.4-7.1
Albumin (g/dL)	3.4	2.6-3.3
BUN (mg/dL)	29	8-28
Creatinine (mg/dL)	1.4	0.5-1.7

Electrocardiography (ECG) was performed with the dog positioned in right lateral recumbency using a six-channel electrocardiograph (Cardiart 8108; BPL Medical Technologies, Bangalore, India). The tracing revealed a sawtooth baseline with absent P waves, consistent with atrial flutter. In addition, wide QRS complexes accompanied by deep S waves were observed, indicative of right ventricular hypertrophy (Fig. 1). Lateral thoracic radiographs showed cardiomegaly, with the cardiac silhouette occupying 3.5 intercostal spaces and a vertebral heart score of 12v. Additional findings included pulmonary edema in the perihilar region and elevation of the carina (Fig. 2a). On the ventrodorsal projection, the presence of right atrial enlargement depicted by bulging at 9 to 11 o'clock and pleural effusion was evident (Fig. 2b).

Echocardiographic examination showed marked enlargement of the right heart and thickened right ventricular wall, accompanied by flattening of the interventricular septum (Fig. 3). The left ventricular volumetric parameters like EDV (47 mL) and SV (19.9 mL) were reduced, while other left ventricular dimensions and systolic function remained within normal limits. The left atrium was not enlarged. The pulmonic valve leaflets appeared thickened and tethered (Fig. 4), with evidence of moderate pulmonic regurgitation. Doppler evaluation revealed an increased flow velocity of 5.24 m/s and a pressure gradient of 109.83 mmHg (reference: <1.5 m/s, <10 mmHg) (Fig. 5), consistent with severe pulmonic stenosis. Additionally, the tricuspid valve leaflets were thickened, and mild to moderate tricuspid regurgitation was observed. Echocardiography also demonstrated dextroposition of the aorta along with a large perimembranous ventricular septal defect (Fig. 6). Transaortic flow velocity was within normal limits. No evidence of pericardial or pleural effusion, and no masses were observed. Considering the group of echocardiographic abnormalities, the dog was definitively diagnosed with Tetralogy of Fallot.

Treatment and Discussion

Because surgical correction of Tetralogy of Fallot is not available for dogs in India, supportive management was instituted. Oxygen supplementation, exercise limitation, stress reduction and Propranolol (0.1 mg/kg tid) for reducing RVOT obstruction were recommended, while phlebotomy or hydroxyurea was suggested as potential options should secondary

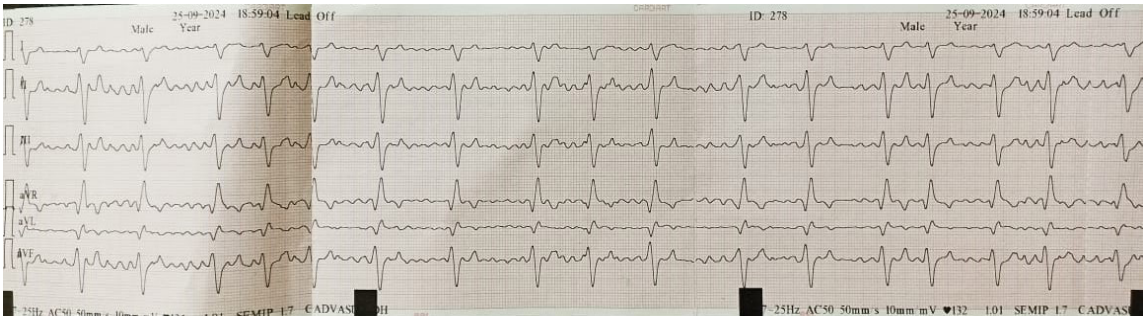

Fig. 1: Electrocardiogram at 50 mm/sec velocity and 10 mm/mV sensitivity depicting sawtooth baseline with wide QRS complexes and Deep S waves representing atrial flutter and right bundle branch block

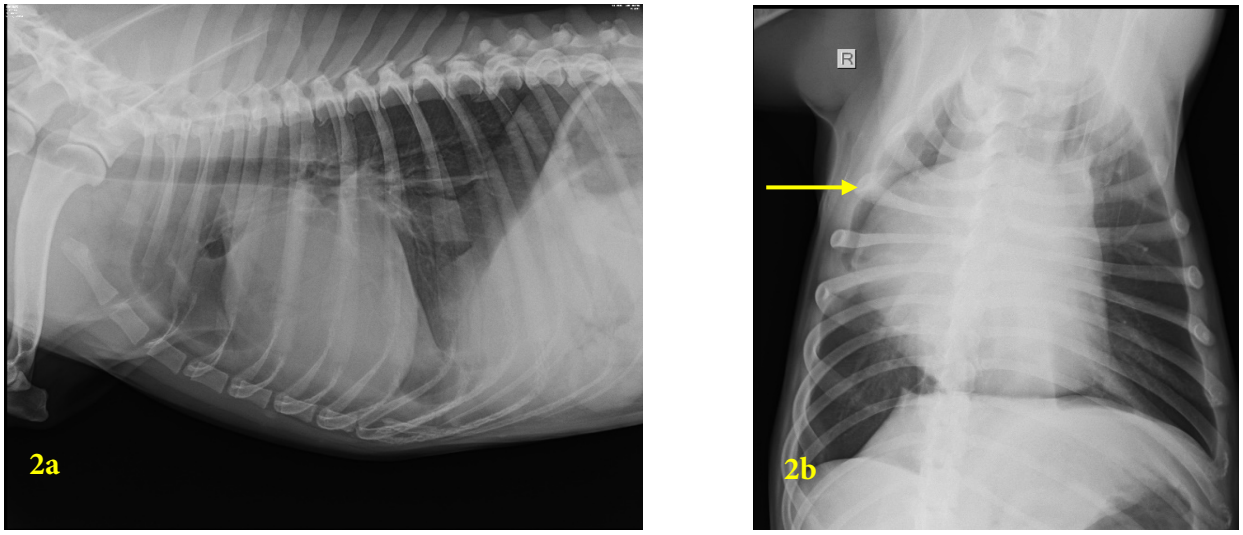

Fig. 2: Lateral thoracic radiograph (Left) showing cardiomegaly and Ventrodorsal view (right) depicting bulging at 9 to 11 o'clock indicative of right atrial enlargement giving an inverse D appearance of heart.

polycythemia develop in the future. Owners were advised regarding the poor prognosis and that therapy was aimed at maintaining quality of life rather than providing a cure.

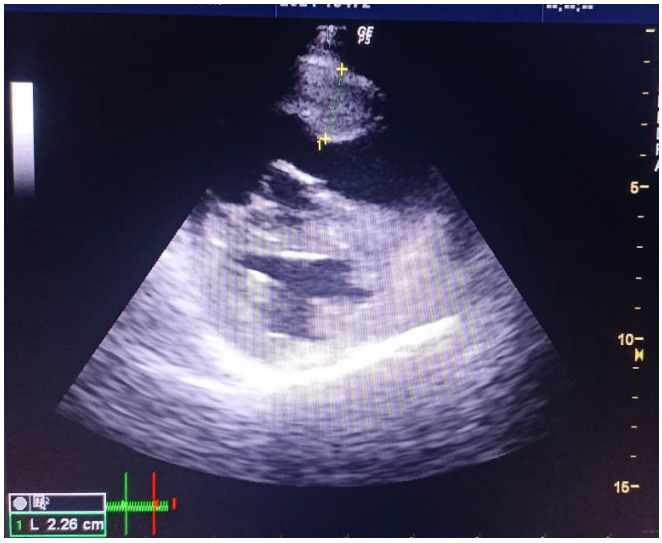

Fig. 3: Right parasternal short axis view showing flattening of interventricular septum and severe hypertrophy of right ventricular wall (2.26 cm)

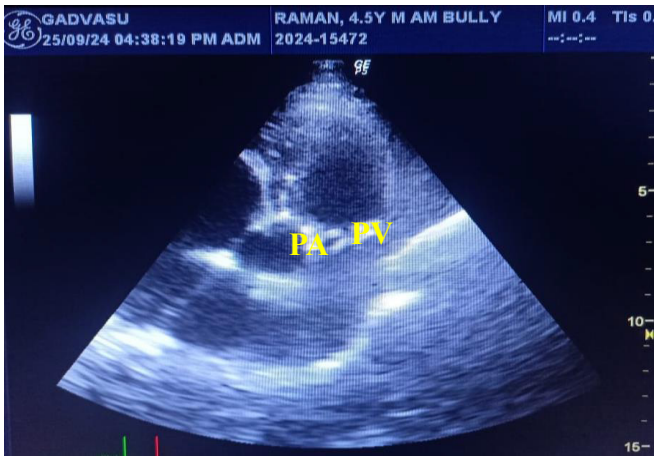

Fig. 4: Right parasternal short axis view at level of pulmonic valve showing thickened and stenotic pulmonic valves

Tetralogy of Fallot (ToF) is characterized by four cardinal anomalies: ventricular septal defect (VSD), Pulmonic stenosis (PS), overriding of the aorta, and RV hypertrophy. Typically, the VSD is large and perimembranous; however, it may extend over much of the septum or be positioned directly beneath the pulmonary valve (Beijerink *et al.,* 2017). PS is a key determinant of clinical severity, may manifest as subvalvular narrowing, combined subvalvular and valvular stenosis, or, less frequently, as an isolated valvular form (Boon, 2011). Haemodynamically, obstruction of the RV outflow tract reduces pulmonary blood flow and systemic arterial oxygenation, while elevated RV systolic pressures favour right-to-left shunting across the VSD. Consequently, unoxygenated blood bypasses the pulmonary circulation and enters the systemic circulation, producing cyanosis and exercise intolerance (Strickland and Oyama, 2016).

In the present case, echocardiography revealed all four hallmarks of ToF: a perimembranous VSD with a dextroposed aorta, severe pulmonic stenosis, marked right-sided chamber enlargement with interventricular septal flattening, and concentric RV hypertrophy. The measured RV free wall thickness (22.6 mm) was substantially greater than the LV free wall, confirming disproportionate hypertrophy. Clinically, the dog exhibited exercise intolerance, weakness, panting, and loud bilateral murmurs, which correspond with reports that severe PS correlates with audible murmurs and a poorer prognosis (Chetboul *et al.,* 2016). Although chronic cyanosis often induces secondary polycythemia, haematology in this case was unremarkable, suggesting minimal or absent compensatory erythrocytosis, a feature occasionally noted in adult ToF presentations (Malcolm and Saunders, 2024). Arrhythmias, particularly atrial fibrillation or conduction abnormalities such as right bundle branch block (RBBB), are also described in chronic cases, secondary to chamber enlargement and conduction delays (Varshney, 2020).

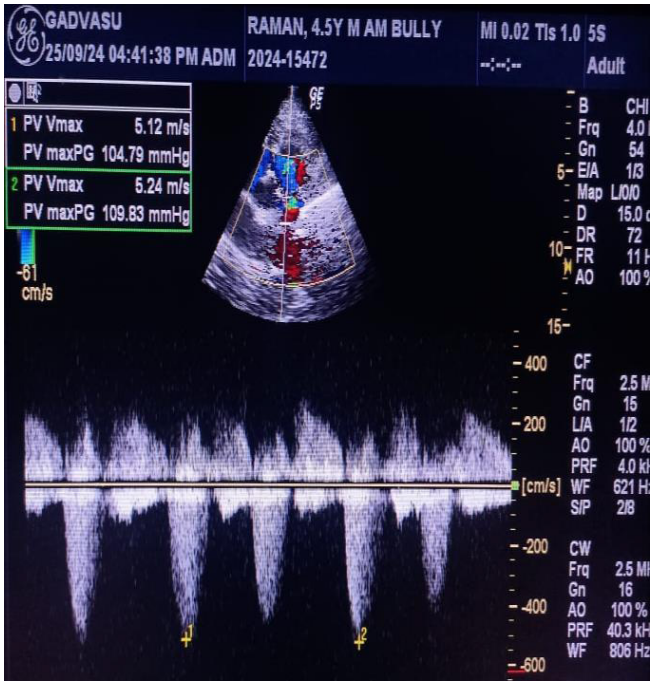

Fig. 5: Continuous wave and color Doppler mode depicting severe pulmonic stenosis (Pressure Gradient across Pulmonic valve = 109.83 mmHg)

The only curative approach for Tetralogy of Fallot is surgical repair of the individual cardiac defects. However, such corrective surgery is rarely performed in veterinary patients, and published reports detailing the procedure and its outcomes are limited. Complete closure of the ventricular septal defect is rarely performed; currently, balloon valvuloplasty is the most commonly applied intervention, which often yields satisfactory outcomes (Weder *et al.,* 2016). There are also surgical techniques that create a shunt from the systemic to the pulmonary circulation (Beijerink *et al.,* 2017). Under medical management, the median survival time due to cardiac-related causes in dogs and cats diagnosed with

Tetralogy of Fallot is approximately 23.4 months (Chetboul *et al.,* 2016). Current recommendations aim to maintain the packed cell volume (PCV) between 55% and 65% to mitigate hyperviscosity risks. Phlebotomy is the mainstay of treatment for polycythemia, if present (Beijerink *et al.,* 2017). Beta-adrenergic blockers such as propranolol can be beneficial by reducing RVOT gradients and alleviating dynamic obstruction (Strickland and Oyama, 2016).

In conclusion, this case underlines the importance of comprehensive diagnostics -including ECG, radiography and echocardiography to accurately characterize cardiac anomalies. The presence of arrhythmias adds complexity to the clinical picture. Given the age and relative stability, interventional management such as balloon valvuloplasty represents a reasonable palliative option to improve quality of life. Regular monitoring, together with thorough client counseling about the guarded prognosis, is crucial for optimal case management.

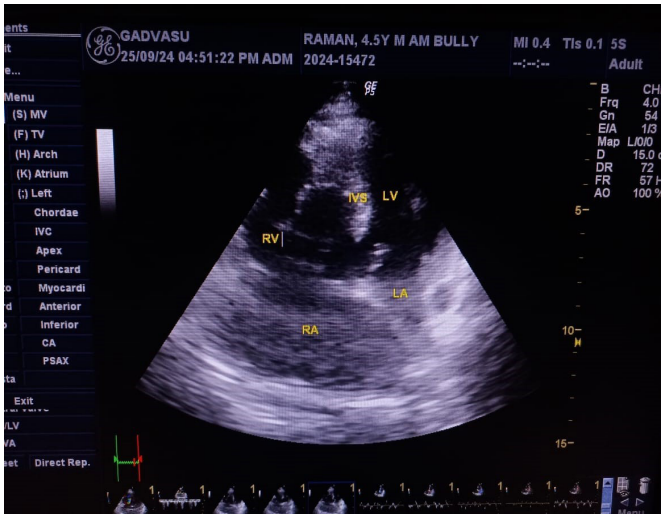

Fig. 6: Left Apical four chamber view showing large perimembranous Ventricular septal defect along with enlarged right atrium and thickened right ventricle

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References

Beijerink, N.J., Oyama, M.A., & Bonagura, J.D. (2017). Congenital heart disease. In: S.J. Ettinger, E.C. Feldman, & E. Côté (Eds.*). Textbook of Veterinary Internal Medicine: Diseases of the Dog and the Cat*. 8th edn., Philadelphia, Saunders Elsevier, pp. 2952-3032.

Boon, J.A. (2011). *Veterinary Echocardiography*. 2nd edn., Wiley Blackwell. Ames, Iowa, USA, p. 667.

Chetboul, V., Pitsch, I., Tissier, R., Gouni, V., Misbach, C., Trehiou-Sechi, E., Petit, A.M., Damoiseaux, C., Pouchelon, J.L., Desquilbet, L., & Bomassi, E. (2016). Epidemiological, clinical, and echocardiographic features and survival times of dogs and cats with Tetralogy of Fallot: 31 cases (2003-2014). *Journal of the American Veterinary Medical Association, 249*(8), 909-917.

Dabhi, D.M., Dhami, A.J., Parikh, P.V., & Patil, D.B. (2009). Comparative evaluation of haematological parameters in 19 healthy and pyometra affected bitches. *Indian Journal of Animal Reproduction, 30*, 70-72.

Malcolm, E.L., & Saunders, A.B. (2024). Complex Tetralogy of Fallot in an Acyanotic Adult Dog. *Cardiovascular Imaging Case Reports, 8*(3), 231-235.

Oliveira, P., Domenech, O., Silva, J., Vannini, S., Bussadori, R., & Bussadori, C. (2011). Retrospective review of congenital heart disease in 976 dogs. *Journal of Veterinary Internal Medicine, 25*(3), 477-483.

Strickland, K.N., & Oyama, M.A. (2016). Congenital Heart Disease. In: F.W.K. Smith, L.P. Tilley, M.A. Oyama, &M.M. Sleeper (Eds.). *Manual of Canine and Feline Cardiology. 5th* edn., St. Louis, Elsevier, pp. 218-236.

Varshney, J.P. (2020). *Electrocardiography in Veterinary Medicine*. Springer, Singapore.

Weder, C., Ames, M., Kellihan, H., Bright, J., & Orton, C. (2016). Palliative balloon dilation of pulmonic stenosis in a dog with tetralogy of Fallot. *Journal of Veterinary Cardiology, 18*(3), 265-270.