How I approach . . . a puppy with a murmur

Mike Martin MVB, DVC, MRCVS
Veterinary Cardiorespiratory Centre, Kenilworth, UK

KEY POINTS

- The principal task is to identify whether the murmur is systolic or whether it is the murmur of a patent ductus arteriosus.
- A flow murmur is systolic and may vary with heart rate, being less intense or even disappearing at low heart rates.
- The intensity (loudness) of a murmur does not necessarily correlate with its severity.

Flow murmurs

It is not uncommon for puppies to present with flow murmurs (physiological or innocent murmurs) that result from an increase in blood flow through the aorta or pulmonary artery. These are usually fairly quiet, although they tend to vary in intensity, often with a variation in heart rate, whereas pathological murmurs are usually constant. Thus, examining the heart until the animal relaxes, and the heart rate slows, is important, since flow murmurs often disappear or become very quiet. Flow murmurs usually disappear by six months of age. Re-examination at that time to check whether the murmur persists or not might be a useful follow-up examination.

Pathological murmurs

Murmurs (**Table 1**) may be characterised by their intensity, point of maximum intensity (PMI) and timing. Murmurs may be classified into three very simplified categories:

- Quiet (difficult to hear, Grades 1 & 2).
- Moderately loud (fairly easy to hear, Grades 3 & 4).
- Very loud (such that a precordial thrill can be palpated, Grades 5 & 6).

Location of the PMI is often a very useful clue to the origin of a murmur. However, this is easier in theory than in practice because, in puppies, the head of the stethoscope may be as large as the heart itself and trying to locate the PMI is difficult.

The majority of congenital murmurs are systolic, except for a patent ductus arteriosus (PDA) which is continuous, running through systole and diastole (**Table 2**). This is the single most important murmur to identify, mainly because it can be corrected. Although the PDA has a very characteristic sound, it can be easily missed if careful auscultation of the region around the left heart base and above is not performed. PDAs can be corrected surgically via a thoracotomy and ligation or by a catheterisation technique and then coil embolisation (avoiding thoracotomy), so early referral is mandatory.

A quiet murmur (Grade 1 or 2) that does not become less intense with age, as a flow murmur might, could be associated with a congenital defect – for example, mild aortic stenosis may present with a quiet murmur, although it may become a little louder as time passes. The action that

Table 1

The most common causes of murmurs in puppies

- Flow murmur
- Patent ductus arteriosus (PDA)
- Aortic stenosis (AS)
- Subaortic stenosis (SAS)
- Pulmonic stenosis (PS)
- Ventricular septal defect (VSD)
- Tricuspid valve dysplasia – a major cause of tricuspid valve regurgitation (TR)
- Mitral dysplasia – a major cause of mitral valve regurgitation (MR)
- Tetralogy of Fallot

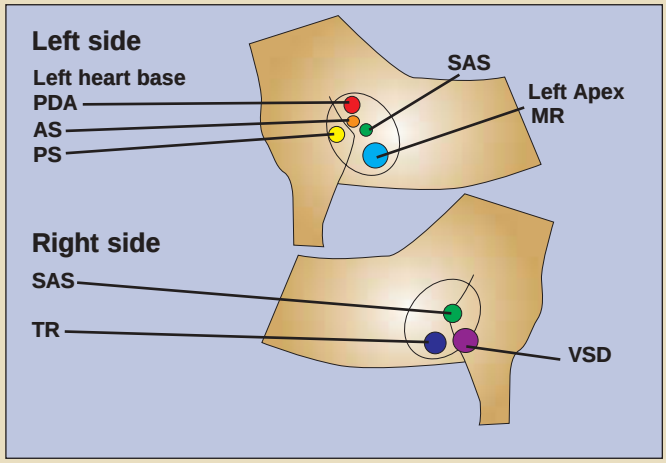

Figure 1 *The PMI of cardiac murmurs due to various lesions. At the left heart base the murmurs of a PDA, AS and PS are heard maximally; at the left apex the murmur of mitral valve incompetence is heard best and over the 'mid heart' area the murmur of SAS is heard. On the right thorax, the murmur due to tricuspid valve incompetence is heard over the mid apical area, AS or SAS towards the right heart base and a VSD near the sternum*

Table 2

Features of a PDA

- Continuous murmur – runs through systole and diastole
- Usually loud and produces a palpable precordial thrill
- Can be quite localised
- The PMI is just above and forward of the left heart base
- The femoral pulse is often 'short and sharp'

should be taken very much depends upon the owner. In many cases it is reasonable to re-examine in a few weeks time to determine whether the murmur persists or is becoming louder or quieter. However, if the owner is concerned, further investigations of the murmur should be recommended.

A murmur that is louder (Grades 3–6) would most commonly be associated with a congenital defect. In these cases, further investigations should be considered. Some congenital defects may not be associated with a murmur, such as right to left shunting defects. In these cases, cyanosis may be the most useful clue. Fortunately, however, these are rare.

Finally, and probably most usefully, breed predisposition is of great value in predicting the most likely cause of a murmur – for example, in the UK, if a Boxer dog presents with a left-sided systolic murmur, the most likely cause is subaortic stenosis. Lists of breed predispositions can be found in many textbooks (1–3) and these could be copied and attached to the back of a cupboard door in the consulting room.

Further tests

Doppler echocardiography performed by an experienced cardiologist is necessary for definitive diagnosis in the vast majority of cases. Radiography and electrocardiogram (ECG) usually provide too little information, although they can occasionally suggest a diagnosis, particularly if a poststenotic bulge is evident on the DV view. They cannot offer as reliable and definitive a diagnosis as Doppler echocardiography and they do not provide an assessment of severity. However, in the absence of this facility, ECG and radiography may help to narrow the differential diagnosis or screen for heart failure.

REFERENCES

1. Fox, P. R., Sisson, D. D., Moise, N. S. *Textbook of Canine and Feline Cardiology*, 2nd edn. Philadelphia: W. B. Saunders Co., 1999.

2. Kittleson, M. D., Kienle, R. D. *Small Animal Cardiovascular Medicine.* St Louis: Mosby, 1998.

3. Martin, M. W. S., Corcoran, B. C. *Cardiorespiratory Diseases of the Dog and Cat.* Oxford: Blackwell Science, 1997.