Confronting three great men of cardiology

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This is an extract from Dr Samway Writes to the Editor, The Life and Times of an Exceptional Physician (1857-1931) by Tom Treasure

Background to the extract

At the time covered by this chapter, Dr Daniel Samways was working as a general practitioner in Mentone (sic) on the French Riviera. At this point he had a Cambridge MD based on a study of 196 hearts of patients who had died at Guy's with mitral stenosis[1] and had published experimental work done in Paris for a French MD.[2-4] Before turning to medicine he had gained a double first in physics in Cambridge and had published postgraduate research in physics from Zurich[5, 6]. He did not hesitate to employ his knowledge of physics to point out flawed thinking in medicine throughout his writing career. He had recovered from tuberculosis and for the rest of his life stayed — from October to April — on the French Riviera for the sake of his health. Samways was well able to tackle the prominent figures in the developing subject of cardiology when he thought they needed to think more clearly about physical principles in valvular heart disease. The illustration is a portrait photograph of Dr Samways taken near his wife's childhood home and used with Permission from Cambridge University Library.

Extract: Chapter thirteen. Confronting three great men of cardiology.
Samways wrote the articles that feature in this chapter, in Mentone *(sic)*, between November 1896 and May 1897.[4, 7-9] His research on mitral stenosis at Guy's Hospital had been blown off course by tuberculosis. He used publications of three prominent teachers of medicine, physiology and cardiology as opportunities to communicate his own original research work and to promote his ideas. He challenged scientific imprecision, and what he saw as received wisdom, poorly thought through.

These are three instances where Samways displays his willingness to challenge the giants of cardiological teaching. The first was William Osler (1849-1919) whose name is

remembered as one of the physician founders of Johns Hopkins Hospital in 1889. Osler was a revolutionary teacher of the practice of medicine. His textbook, *The Principles and Practice of Medicine: Designed for the Use of Practitioners and Students of Medicine,* was written while he was Professor of Medicine at Johns Hopkins University. [10] The book, published in 1892, established Osler as the world's leading authority in the teaching of modern medicine.

Samways introduced himself as Late Fellow of St John's College Cambridge but gave his address as Mentone. His article "The left auricle in mitral stenosis: hypertrophy and dilatation"[7] opens with reference to Osler's book[10].

> Professor Osler, in his *Principles and Practice of Medicine*, refers to the changes which take place in the left auricle in cases of mitral stenosis in these words: "The left auricle discharges its blood with greater difficulty, and in consequence dilates, and its walls reach three or four times their normal thickness."[10] "Eventually the tension is increased in the pulmonary circulation owing to impeded outflow from the veins. To overcome this the right ventricle undergoes dilatation and hypertrophy, and upon this chamber falls the work of equalising the circulation."[10]

For good measure Samways also quoted from the late Dr Charles Fagge (1838–1883) who had been a Guy's Physician.

> A somewhat similar statement occurs in Dr Fagge's *Medicine ,* where one reads "The effect of mitral stenosis on the heart will naturally be to produce dilatation and hypertrophy of the left auricle"[11].
>
> These statements I believe to be misleading and erroneous, especially as given by Professor Osler, who seems to regard dilatation and hypertrophy as being both useful factors in maintaining the circulation.[7]

Samways supports his challenge at some length with Guy's data from his Cambridge MD thesis. I have summarised the data in the chapter about his research in the postmortem room at Guy's Hospital and in the Afterword. Challenging Osler he referred to the 18 patients from the surgical wards who died *with*, but not because of, mitral stenosis. Of the 18, 17 did not have a dilated atrium contrary to Osler's generalisation. The hearts had been able to "compensate" for the mitral stenosis, meaning that the heart was coping and delivering sufficient blood flow and at adequate pressure for the body to function albeit within certain limits of exercise tolerance. The narrowing of the mitral valve usually develops slowly, and this phase of compensation may be maintained for years. The individual might be comfortable at rest and not distressed by ordinary activities around the home. People learnt to live with it, to be uncomplaining, and to accommodate their activity to what the heart could cope with.

Samways had a more informed and systematic appreciation of the features—the morbid anatomy—of a heart with mitral stenosis. It was apparent to Samways, from his observations in the postmortem room, that the chamber upstream, the left auricle—then universal usage for the left atrium—dilated when it could no longer cope. Dilatation meant that it ballooned up. Heart function was then on a downward spiral. The point was that dilation is a feature of "decompensation" not an effect of rheumatic heart disease or of mitral stenosis *per se*. Having completed a thesis entirely devoted to studying the mitral valve it was an important distinction which he was able to make with confidence because of the scientific method of his study. Osler, on the other hand, could only base his view on sporadic recollections, seeing the hearts of some of his patients who died of mitral stenosis, in the course of a busy week's work. To represent Osler fairly he had compiled a comprehensive textbook on the whole of known medicine. Samways, on the other hand, had devoted a year or more studying a large number of cases in detail to amass his knowledge on the details of the effects of one disease on just one of the heart valves. That is the authority a young doctor has, for a while, after completing an MD or PhD at the boundaries of what is known.

Next in line for attention was Dr Ernest Starling (1866-1927), a young and still rising star in the galaxy of physiology. He entered Guy's Hospital in 1882 aged 16. Starling is remembered for "laws" with his name attached. Starling's Law of the Heart relates to the force of contraction of the heart in response to the filling pressure. The normal heart, within certain limits, will deliver what has been returned to it. In the last chapter I referred to Starling's Law of Capillaries. This was his Law of the Heart included in the prestigious series of three "Arris and Gale Lectures" at the Royal College of Surgeons in London on the Monday, Wednesday, and Friday of the same week in February 1897.[12-14] The lectures were published in full in The Lancet which is where Samways would have read them. He wrote to the Editor of The Lancet from Mentone in March:

> Dr Starling in the first of the Arris and Gale Lectures, reported in The Lancet of Feb. 27th, made the following statement, which seems to me incorrect in almost every particular: "If the aortic pressure is maintained at its normal height it is evident that in mitral stenosis the work done by the ventricle must be increased above its ordinary amount, since a certain fraction of the work is wasted in driving blood back into the auricles. Hence the result of mitral incompetence is, first, increased diastolic dilatation of the left auricle and left ventricle, which later becomes more or less permanent; and, secondly, hypertrophy of the muscular walls of both these cavities"[12].

In this context "incompetence" means that the valve is allowing blood to leak back into the chamber upstream. The words incompetence, regurgitation and reflux tend to be used interchangeably in cardiology. Starling had strayed from physiology into cardiac pathology. Samways wrote his letter on his 40th birthday. Starling was only 30 and had

made a rapid ascent. It is very likely that Samways would have known Starling at Guy's. In the 1960s, when I was a student there, one could know just about every doctor at Guy's and certainly the notable names. It was even more likely in the 1890s when the staff were generalists, and the specialties were much less developed. Samways may even have regarded Starling as a bit of an upstart and there may have been an edge of professional jealousy.

In this extract from his lecture Starling does indeed appear to conflate stenosis and regurgitation. Also, Samways knew from his studies, that the left ventricle was spared in mitral stenosis. It was downstream of the mitral obstruction, and its own work was lessened, not increases. In his hypothetical case Starling had both cardiac chambers hypertrophied and dilated. It was all a bit of a muddle. It would be surprising if Samways, a man who liked precision, and had studied physics to a high level, had not found it irritating. Samways had worked hard to obtain systematic data for his MD thesis which, due to his illness, he had not managed to disseminate as he would have liked. Starling's lecture gave him the opportunity to get a few columns in The Lancet to cite his own research at Guy's[4, 7].

The third of the giants was James Mackenzie (1853-1925) the son of a Scottish farmer who left school at 14 to be a chemist's apprentice. Like Samways he was a late entrant to university. He was 21 when he entered the University of Edinburgh. He qualified four years later. At the time of this BMJ article he was a general practitioner in Burnley, Lancashire and was already making waves in cardiological thinking and research. He published a substantial paper in the BMJ, "A probable diagnostic sign of tricuspid stenosis", supported by elegant smoked drum recordings of pulsations in the arteries and veins in the neck, and of the liver. The tricuspid valve is the non-return valve between the filling chamber (right atrium) and the pumping chamber (right ventricle) on the right side of the heart[15]. The vein draining the liver into the atrium is short and wide so the veins of the liver respond to pressure waves in the right atrium. If the outlet from the right atrium is obstructed by narrowing, that is tricuspid stenosis, the waves of back pressure may be felt in the liver. But Samways contested Mackenzie's interpretation of the liver pulsations. Writing from Mentone on 22 May, Samways concluded his letter:

> My mind resents the dual supposition that the auricle must send nearly all its blood forwards for a patient with stenosis to live so long and well, and nearly all its blood backwards to swell the liver and produce "auricular wave *(b)*"[8].

There was a riposte from Mackenzie written on 29 May[16] and Samways wrote back to the BMJ on 12 June, this time from Crouch End[9]. The editor drew a line under what was unresolvable disagreement writing: "This correspondence must now close".

Correspondents in the BMJ and The Lancet were allowed great freedom of expression and a lot of space, unconstrained by pre-publication peer review. But it was not uncommon for the editor to call a halt. Mackenzie was inclined towards "wilder impulsive flights of fancy" that Sir John McMichael referred to when he reviewed the "Mackenzie-Lewis Era" for the Royal College of Physicians. Sir James Mackenzie and Sir Thomas Lewis would argue fiercely and mercilessly with those who disagreed with them. [17] By 1902 Mackenzie had become "the world clinical authority on the heart" but McMichael wrote in his Harveian Oration that "Mackenzie had conjured up in his own mind a private and personal cardiac physiology all his own".[18] Mackenzie is revered in the history of British Cardiology but Samways, who was forgotten, had the courage to seek clarification on some of what he wrote. Lewis clung on to his armchair-reasoning for why surgical relief of mitral stenosis couldn't possibly work. Samways predicted in 1898 it should be possible, but it was 50 years before it became a clinical reality.

As an incidental observation the speed of turnaround of these letters is striking. The four letters exchanged between Mackenzie in Burnley, and Samways in Mentone, and were published in the British Medical Journal on 8th, 22nd, 29th May and 12th June. The BMJ came out on Saturday and a written letter received as late as the Wednesday before lunchtime, or by telegram up to Thursday morning, could be included. These were lively exchanges and with a rapid turnaround. These letters in the late 1890s were fired off and published with no possibility of peer review before printing. The correspondence *was* the peer review, conducted in public.

While writing a biography of Samways I was impressed by his willingness to take on these arguments, at the highest level, in The Lancet and the BMJ. He is unflinching in feeling entitled to challenge. He was more polite than some but saw no need for undue deference and he brought what evidence there was to the fore. The lifetime contributions of Osler and Starling were highly significant and remain so, in the clinical practice of medicine and its underpinning in physiological science, respectively. Samways questioned the physician Osler, on the basic scientific facts, and the scientist Starling, on his understanding of clinical heart disease. The integration of these two elements, scientific evidence and clinical practice, was the central message which he had taken from Donald MacAlister's lecture "Natural Science and Medical Practice" at St John's.[19]

By contradicting apparently authoritative and definitive statements from three leading figures—Osler, Starling and Mackenzie—Samways was actively seeking to disseminate a more informed understanding of the progressive damage to the heart following rheumatic fever. His Guy's MD work was a systematic study, not only of the hearts of patients who had died from the disease, but also people who died of other causes, in whom mitral valve disease was an incidental finding. He wanted this new knowledge to replace sporadic observations. He introduced "a statistical enquiry" where there had

been none before.[1] From this he presciently deduced that mitral stenosis might be amenable to surgical relief.[20]

Declarations

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