

RCPE Casenotes: Past & Present Podcast - Diabetes Transcript

Narrated and curated by Dr Daisy Cunynghame, heritage manager and librarian at the Royal College of Physicians of Edinburgh.

[introductory music]

Welcome to the Royal College of Physicians of Edinburgh's Casenotes podcast. Over the next few months we're going to delve into the different physician branches or specialties.

Just to start off with, what is a physician? Most people know what a GP is, and what a surgeon is, but not everyone knows exactly what a physician does. Well the formal description is specialists in internal medicine, so diseases and complaints that happen inside your body. And even if that sounds unfamiliar, you have almost certainly heard of a lot of the areas that this covers, like cardiology, diabetes, allergies, palliative care, infectious disease and neurology. These are all branches of medicine, or specialties, that physicians are responsible for.

In each coming episode of Casenotes we will pick one of these specialties and delve into its history, looking at its development over hundreds of years, and some of the interesting stories and cases from the past. We'll also talk to a current physician working in that area, to find out what it is like to be working as a specialist physician in the twenty-first century.

[musical interlude]

In this episode of our Casenotes podcast we are delving into diabetes. We'll be looking at the history, and then talking to Professor Mark Strachan, a consultant physician. We don't have a historical case study today, instead we're going to explore a case study with Mark from his practice.

We're going to touch on the inventions and discoveries relating to diabetes, but we're also going to look at some of the weird and unusual medical treatments which have been adopted through the centuries. Because diabetes is an ancient disease, recognised since antiquity, but where effective treatment only came about in the twentieth century,

doctors throughout the centuries made many fruitless attempts to try and treat this seemingly untreatable disease. But let's start from the beginning.

Diabetes is one of the world's oldest known diseases. The phrase "the passing of too much urine" appears in an Egyptian manuscript written around 1550 B.C. The Greek physician Aretaeus, writing in the first century A.D., gave the first complete clinical description. He noted the excessive amount of urine which passed through the kidneys, and used the word diabetes - derived from the Greek meaning "siphon" or "to pass through" - to describe the condition. But these discoveries brought physicians no closer to knowing what to do about diabetes.

Early Greek doctors recommended trying exercise, particularly horseback riding, as this was believed to reduce urination. They also recommended warm clothing, cold bathing and massages. In the 1600s the English physician and anatomist Thomas Willis rediscovered what eastern physicians had observed a thousand years earlier: that in some forms of what he called the "pissing evil", the urine of patients was – as Willis put it – "wonderfully sweet". He used *mellitus*, the Latin word for honey, to distinguish between this condition and other causes of excessive urination.

Tasting urine was, then, a key method physicians adopted to diagnose diabetes. But what to do about it? Narcotics, including opium, were recommended. Tobacco smoking was also often prescribed. In one domestic recipe book from our College's historic collections, kept by a Mary Sawyer who unfortunately we don't know much about, a treatment for diabetes is given. It says "only drink plenty of wine, leaving off malt drinks and drink spa waters which has done great cures".

In the early 1700s Johann Brunner, a Swiss anatomist, came close to discovering pancreatic diabetes. He removed the pancreas from dogs and noted that they displayed extreme thirst and polyuria. These are regarded as the first experiments on the internal secretion of the pancreas.

Another great advance took place in the 1770s when Matthew Dobson, from Yorkshire, carried out further experiments. By evaporating the urine of a diabetic patient, Dobson was the first to prove the presence of

sugar in urine. He also made the crucial observation of the excess of sugar in the blood, and demonstrated that diabetes is a systemic disorder rather than, as had previously been thought, a primary disease of the kidneys.

But the treatments which were being used on patients remained much the same as they had been centuries earlier. One published recipe collection, titled *The Poor Man's Physician*, authored by church minister John Moncrief and published in Falkirk, is a compilation of the recipes of numerous physicians and folk-healers. This book contains a recipe to treat what Moncrief called "Diabetes, or extraordinary pissing". It recommends taking an emetic, also known as a vomit, or in Scotland as a "peuk", alongside ass's milk in which hot stones had been immersed. Another recipe from Moncrief for so-called "extraordinary pissing" contained the brains and stones of a hare burnt and drunk, a snail burnt with its shell, hare's dung, powder of burnt mice, the hoofs of a hog burnt and roasted hazelnuts.

The English physician Thomas Cawley, working in the 1780s, was the first to suggest a relationship between the pancreas and diabetes. He noted that the pancreas of a patient who had died of diabetes showed stones, and signs of tissue damage. The significance of this vital clue was not to be appreciated for another hundred years.

Later in the 1700s the Scottish physician John Rollo began trialling different diets on diabetes patients. He settled on a high fat and protein, and low sugar diet, the first significant dietary approach to the treatment of diabetes. Diet now became a major focus for physicians attempting to treat diabetes and many different forms of diet were tried. From fasting to an egg-only diet, no fruits or vegetables, to the "oat cure", "potato therapy" and the "starvation diet".

In the 1890s Oscar Minkowski, a German physician and physiologist, produced experimental diabetes by removing the pancreas of a dog. This proof of the role of the pancreas in diabetes was of major importance in understanding the disease. The next step was closer to our College's home turf in Edinburgh where Edward Schafer was Professor of Physiology at the University of Edinburgh. He theorised that the pancreas must secrete a substance which governed

carbohydrate metabolism. For this suspected internal secretion of the pancreas Schafer suggested the name “insuline”.

At the University of Toronto, Frederick Banting, assisted by a second year medical student, Charles Best, finally made the discovery which revolutionised the treatment of diabetes mellitus. In 1922, only eight months after beginning their experiments, they announced the isolation of insulin from the pancreas of a dog. In 1923 Banting was awarded the Nobel Prize. This was only the beginning of the development of diabetes treatment, but physicians now had an understanding of the disease to build on, an understanding that was sorely missing in the times of treatment by wine, dung and horseback riding.

[musical interlude]

Daisy: So we have with us today Professor Mark Strachan. So I was wondering Mark, you know before we really get into things, could you just tell us a little bit about yourself and where you work?

Mark: Yep. Hello Daisy and hello everybody. So yeah, I’m a consultant in diabetes and endocrinology at the Western General hospital in Edinburgh. I’ve been a consultant now for approaching twenty years and I’ve got a wide range of interests across the endocrine spectrum, but a lot of the work I do in endocrinology is around endocrine cancers, thyroid cancer and neuroendocrine cancer.

Daisy: Thank you very much. So I guess just to start with the absolute basics, what is diabetes and endocrinology? Could you just sort of summarise for us what it actually means?

Mark: Yep. So a very, in its broadest sense diabetes and endocrinology is the study of hormones, so it’s the clinical discipline that involves disorders related to hormone action or deficiency. Diabetes obviously is something that most people will be familiar with – an elevation of blood sugar in the body which can cause a variety of long-term complications. Endocrine disorders tends to involve abnormalities in the thyroid gland, the pituitary gland, the adrenals, and the testes and the ovaries, so we really deal with a wide range of disorders across many, many different systems. So I always like to say to people, we are not a mono-organ speciality, we are a whole-body speciality, and in fact a very, very, very

wise older clinician that I was taught by by a medical student, always used to say that there are only three “disorders” that appear in every single chapter of Davidson’s textbook of medicine. And he said, those three conditions are alcohol, amyloid, and diabetes. So endocrinology and diabetes is a true multi-system speciality.

Daisy: Thank you. So as you say, you know, your specialty is one that people are pretty aware of, diabetes is something that people have in their consciousness. So are there any particular stereotypes that you think people have in their heads or misconceptions around what your speciality is, what it is that you do?

Mark: Yeah, I think that would be where there’s, so there’s, so yeah there’s a very, I think, funny consultant rheumatologist now retired in Glasgow called John Larkin and in 2005 he wrote a book called *Cynical Acumen*, in which he gave various sort of humorous anecdotes and vignettes about bedside medical teaching, but he also gave little sort of character summaries about individuals in different specialities, so for example he said, you know, if you’re talking in a room full of cardiologists, you’ll realise very quickly that an abundance of neurones is not a prerequisite for being successful in this speciality. That was cardiology. So for, the opening sentence of his chapter on diabetes and endocrinologists was “endocrinologists [endocrinology] is for losers”. So I would like to offer a defence for endocrinologists against John Larkin! So I think one of the misconceptions about diabetes and endocrinology is that it’s a bit of a staid and stuffy speciality, sometimes maybe a bit boring, and that’s because we don’t have a sort of, a big practical procedure that we do, we don’t do life-saving coronary angiograms and angioplasties like the cardiologists do, we don’t remove foreign bodies and mucous plugs from the lungs like chest physicians, and we don’t dialyse and save the lives of people with kidney failure like nephrologists. And I think again one of the misconceptions came about was that, particularly with diabetes, was in years gone by it could be quite depressing, because there was a limited armamentarium of therapeutics, the therapeutics weren’t very good, and as a consequence people got very advanced life-changing complications of diabetes. But of course like all things in medicine that’s changed and, you know, now diabetes is on the brink of a technological revolution in terms of the management of patients and it’s incredibly exciting, and endocrinology, the pure endocrinology, although it’s not a speciality where we tend to

get, you know, big, sort of, big ticket innovations and changes, it is a very satisfying speciality, it's quite intellectual, you're dealing with numbers all the time, you're dealing with extremely rare disease a lot of the time, and so intellectually it's a very, very satisfying speciality to do. So I think you don't need to be a complete loser to become a diabetologist and endocrinologist.

Daisy: You've mounted a very good defence there, thank you. And so I was just thinking the, you know, there may be people listening to this podcast who are, you know, at school and thinking about studying medicine or who are at university and thinking about which specialty they pick. So if people are considering a career in your specialty, is there anything that you would advise, any particular skills that they need or anything they can do to progress their careers?

Mark: Well, I always say to our medical students and trainees that you need to have a passion and you need to love your speciality. Now, I have been very blessed in my career as a diabetologist and endocrinologist, I have genuinely loved every minute of it, I love being a diabetologist and an endocrinologist. The things that I love about it are that, certainly, well within both disciplines, you get to know your patients very, very well. We, of course one of the sadnesses about diabetes and endocrinology is that there are not many people that we can cure of their underlying endocrine or diabetes disorder, you know, we are managing their diabetes and their endocrine disorders. But what that means is that they come to our clinics over very many years and you get to know them very well. And that for me is a joy, it's like seeing old friends coming in on a regular basis. I think to be a good diabetologist and endocrinologist you have to be a people person, because it is all about the interaction in the clinic room, and in diabetes in particular it is about motivating people to be as healthy in their lifestyle as they possibly can. I think an interest in problem solving and numbers is a good thing to have, and if like me you're not very good when it comes to practical procedures, then diabetes and endocrinology again is definitely the speciality for you. But actually, you know, ultimately it's, the thing that really captures it for me is, obviously the individual people that you meet, it is just the variety, you know? You know across, you know between, in a one afternoon doing an endocrine clinic, I can be seeing somebody with thyroid cancer, somebody who's got a pituitary tumour who doesn't make pituitary hormones, I can see a man who is deficient in testosterone, I can see a

woman with polycystic ovarian syndrome, I can see a young adult with a Graves' thyrotoxicosis. It's incredible variety just in this short space of an afternoon. So yeah, it's a fantastic speciality, I would encourage everyone to think about it.

Daisy: Thank you very much. So you mentioned again, as you sort of mentioned a few times before, how important sort of numbers and data is to your work, which means that this might be a slightly impossible or tricky question to answer, but something that I'm very interested in is, you know, the theoretical museum of medicine, you know, if you have an object from every medical specialty that sort of connects to, you know, therapeutics, to diagnosis, you know, what would the object for your specialty be in this museum of medicine?

Mark: Well, I think the object would have to be an old insulin syringe. The metal syringe that you had to boil in a pan to sterilise, that had a needle that you didn't just use once, that you used again and again and again, that probably initially you had to file yourself to sharpen it, that probably later on you sent off to be filed and sharpened, and I would have that in my museum. And right next to it I would put the state-of-the-art insulin pump with a continuous glucose monitor as a contrast, about where we've been and where we're going to now.

Daisy: That's perfect, thank you very much. So one thing we haven't talked about much, or we have talked a bit about you, but you have been fairly modest in terms of your own achievements, so I was just wondering if you could talk a little bit more about the Type 2 Diabetes Study that you have been sort of a key part of, and the work that you've been doing recently?

Mark: Yeah, well, the Type 2 Diabetes, the Edinburgh Type 2 Diabetes Study started about 15 years ago and it came on the background, so when I was Brian Frier's research fellow, Brian Frier was very interested in hypoglycaemia, and I, all the studies that I, the research that I did, was around looking at the symptoms and physiology of hypoglycaemia. But Brian was very good, he always got his pound of flesh from his research fellows, and when you first started a research post, of course you had to get ethical approval and you had to, you know, it took time to get the research project up and running. So he always got you to write a review on something. And Brian came into my office about three weeks

after I'd started as a research fellow, put a big pile of research papers on my desk, and said: Mark, I've, this is a pile of research papers about cognitive impairment in type 2 diabetes, and I've been collecting them over the years. I'd like you to write a review on this topic. And so I went through all those papers, I did a huge literature search at the time, I managed to get papers, I got one paper in, that was written in Japanese, there was another paper that was written in Spanish, I got these papers translated and I wrote, with Brian's help and with another colleague Ian Deary in psychology, a review on type 2 diabetes and cognitive impairment. And that was the first, really ever meaningful review on that topic. And it's been cited over the years, countless hundreds of times, in fact far and away the most read thing that I've ever written, it was the first thing I ever wrote and it was the most read thing I've ever wrote, and that stimulated in me an interest in the effects of type 2 diabetes on the brain, and in particular on cognitive function and on the risk of dementia. We now know that dementia is probably two to three times more common in people with type 2 diabetes than it is in the general population. And we set up the Edinburgh Type 2 Diabetes Study really to look at risk factors for cognitive impairment and dementia in people with type 2 diabetes. Now, I could never have set this study up myself, and in fact I was incredibly fortunate in many ways that my wife, Professor Jackie Price, is an epidemiologist in public health in the University of Edinburgh, and Jackie's got an interest in large-scale epidemiological studies and in cardiovascular disease. So we set about basically, as a team, in getting funding for the Edinburgh Type 2 Diabetes Study and basically keeping it going. I have to say Jackie did probably a much greater share of the work than I did. But in essence what we did was we recruited just over a thousand people with type 2 diabetes, and we've brought them in to research clinics where we pretty much measured everything in them, and we assessed their cognitive function. And then we brought them back after five years, and then we brought them back after ten years, and we've produced now well over a hundred publications looking at risk factors for cognitive impairment in diabetes. But actually, what was brilliant about that study was, because we had such rich data that we had collected on patients, we were able to look at the epidemiology of lots of other aspects of diabetes. So I remember about a year into the study, Professor Peter Hayes, who's Professor of Hepatology in Edinburgh, came and gave a talk to the diabetes teams of Lothian, and he was talking about liver disease in type 2 diabetes. Now, that's something I'd never really paid any attention to at all, and I didn't

think it was very important, and in fact Peter's basic thesis in the talk that he gave to us was, you diabetologists are a bunch of shysters, because you're ignoring liver disease in your patients with diabetes, and he was completely right. And so I thought as I was just listening to Peter, gosh, we could look at this in the Edinburgh Type 2 Diabetes Study, because we've got all the clinical data, we just need to bring people back and do another, do a liver scan on them, and we can then follow up and see who develops cirrhosis or advanced liver disease in the future. So again, that opened up a whole new avenue of research. So yes, it's been very enjoyable, very productive, I feel we've made a significant contribution in raising the importance of cognitive impairment and dementia in people with type 2 diabetes to the fore, and we've advanced the research on liver disease and type 2 diabetes.

Daisy: Thank you very much, that was really fascinating. So my sort of last question really as we sort of get towards the end is the inevitable question that perhaps nobody wants to be asked, but it's February 2022 and we can't really avoid the subject of coronavirus. So I'm interested in how the pandemic has impacted on your practice personally, but also on your specialty more generally.

Mark: Well, the obvious impact was that we had to, I've said that diabetes and endocrinology is an outpatient speciality, well we had to stop seeing outpatients. Now ordinarily that would have been cataclysmic for us, but actually we were very, very fortunate, because the year before coronavirus struck, 2019, NHS Lothian approved a rollout of FreeStyle Libre continuous glucose monitors to patients with type 1 diabetes, and keeping type 2 diabetes on multiple injections of insulin. And those continuous glucose monitors, whilst improving significantly the information available to people with type 1 diabetes themselves, also we were able to link them in to an IT platform that we had access to in our clinics. So hitherto, before continuous glucose monitoring, we were relying on people coming to the clinic and us taking a blood sample to measure their HbA1c level, as a measure of glucose control, and getting a download from their home blood glucose meters. From 2019, we had rolled out at really significant pace this continuous glucose monitoring system, that meant that actually, remotely, I could just bring up any one of my patients and see exactly what their blood glucose data were, and actually it gave an estimated HbA1c as part of that. So what that meant actually was we, although we were doing

telephone consultations, actually they were still very, very productive consultations because you had access to their data. Now, we would have been completely snookered if we hadn't had this, we would have just been holding meaningless consultations. So we were very, very fortunate in that regard, and of course over the subsequent years we've gradually increased the proportion of people that we're now seeing back face-to-face, but we're still nowhere near the levels that we were. So I would say the majority of our consultations are still by telephone, but actually, I would argue they're still very meaningful and productive consultations, we're just doing it in a different way. And obviously one of the benefits, if you can consider it that way, of coronavirus is that it has turbocharged digital developments in healthcare in general, that hitherto would have taken many years and many hours of beating your head against a brick wall to get progress, but we've been able to make very substantial progress with it. It did mean as well, on a personal level I was redeployed down onto downstream general medical wards, I haven't worked on a downstream general medical ward for many years, and I went back onto a general medical ward which I have to say I thoroughly enjoyed but, you know, it's been hard and it's changed very much the way that we work as a speciality. But one of the great things about working in the NHS, Daisy, is that actually, the individuals who work in the NHS collectively are very resilient, and they're very, very resourceful, and it's amazing how you, this leviathan organisation actually is able to adapt and change and rise to the challenge, and I firmly believe that the NHS has done that, and we've, you know, played our very small part in that.

Daisy: Thank you, and I think all of this is sort of doing a good job of dispelling the stereotype or the myth of the boring specialty, I think. So thank you so much for joining us today, Mark, it's been really fascinating.

Mark: Yeah, not at all, Daisy, I've thoroughly enjoyed it, thank you very much.

[musical interlude]

In our case study today, Mark talks about Sophie, the difficulties of diagnosis and how one individual can change your whole mindset.

Mark: About four years ago, three four years ago, we found out that a patient of ours called Sophie, who I had been looking after for many, many years with type 1 diabetes, we found out that she didn't have type 1 diabetes, she had a rare genetic form of diabetes. And this was life-transforming for Sophie because she was able to come off of insulin, go onto tablet treatment, so she, Sophie had been on insulin for nearly twenty-five years and came off treatment. But Sophie would be the first to say that, over the years, her blood sugar control had been not ideal, because, you know, type 1 diabetes is hard, it's very hard to get good glycemic control. As a consequence, Sophie had quite advanced eye complications of diabetes, and as a diabetes team we were very upset actually, we were very happy for Sophie, but we were actually really quite upset as a team, on many levels. We were upset that we never thought that Sophie might have a genetic form of diabetes, Sophie just always had type 1 diabetes, that was it. And we were upset that, you know, if we'd made the diagnosis earlier, Sophie might not have developed the advanced complications from diabetes that she has now. And we were upset because we knew that, if this has happened with Sophie, then there must be other people coming to our clinic with a label of type 1 diabetes who also didn't have type 1 diabetes, that might have other forms of diabetes that could be managed differently.

So we set about starting to measure a special blood protein called C-peptide which basically helps you work out if somebody's type 1 diabetes might have been misclassified. And we found, when we applied this to our whole clinic, that we had misclassified seven per cent of our patients with type 1 diabetes, had had the wrong diagnosis. Now, in not everyone did that misclassification have a major impact, not everybody was able to come off of insulin. But there were other people we did get off of insulin, including Sandy, who'd been diagnosed with type 1 diabetes in 1963 and who'd been on insulin for fifty years, before actually we realised that he also had a genetic form of diabetes that could be managed with tablets. And so, that was, that whole programme came about because of Sophie. Getting one person, one individual patient, had a transformative effect on our approach in our diabetes clinic, and actually the consequence of that piece of work that we did here at the Weston General in Edinburgh, is that the Scottish Government accepted that actually, this was an important thing to be measuring C-peptide in people with type 1 diabetes and so they agreed to launch a national programme for C-peptide testing, and that was

launched last November, November 2021, and so Scotland became the first country in the world to actually have a full national programme of C-peptide testing, with the necessary add-on tests that are required in people who have detectable C-peptide. And it just, you know, Sheila Reith inspired me to become a diabetologist, but patients also inspire you to do innovative things that actually can be really beneficial in the long term.

[musical interlude]

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