Notes
I would like to take you back to 1974 at Ethicon sutures. During my training, I was driven to the southern Sydney suburb of Botany, to visit the Ethicon Catgut factory. This was quite an experience for someone who, for the past 9 years, had been working on building sites, demonstrating guns that shot nails into concrete and steel, to building contractors.

Catgut, I was told, had been widely used for centuries as ligatures, casings for sausages and salami, instrument strings and more recently, tennis racquet strings. Novak Djokovic still uses 50% Catgut strings in his racquets.

I looked at those huge vats of intestines like white octopus tentacles in fluid and wondered what on earth this had to do with cats? These long white fat noodles definitely had nothing in common with cats – so why is it called Catgut?

Can anybody explain this to me?

We probably need to go back to the era of sailing ships and man-of-war gunships in particular. Each sailing ship had a ship’s surgeon. Unlike a land-based doctor of medicine, these men were unlikely to be university trained apothecaries and masters of herbal medicine. They were laymen who were there to perform basic triage, to re-set broken bones and to do the best they could after cannon balls had ripped through ships’ timbers sending flying shards and splinters through the crews’ flesh.

They became adept at ligating, cauterising, amputating and suturing. They were addressed as “Mr” not Doctor and it is still a point of honour among general surgeons today to be addressed as “Mr”.

These ship’s surgeons always included ligatures made from animal intestines in their surgical kit. It was known as Kit Gut- hence it has been Anglicised over time to Catgut. Of course, it’s quite possible the ship’s quarter masters were Irishmen! That could explain it.

Plain Catgut is harvested from the submucosal layer of sheep intestines. It is suitable for soft tissue approximation where short term wound support is indicated.

Chromic Catgut is harvested from the serosal layer of beef intestine; it is a naturally tougher form of collagen, made even tougher by immersion in a solution of chromic salts which further resists breakdown in the body and as such provides medium term wound support.

Some vets, in particular the more mature, love their catgut. It’s what they trained with, it ties easily and is useful in ligation of large vessels that often have a fatty surround. The Catgut will cinch down through the fat, but not cut through the vessels. However, being of animal origin, Catgut does have some drawbacks. Via its very mode of breakdown in tissue, it evokes an inflammatory reaction. This leads to discomfort, delayed healing, swelling and adhesions.
Secondly, it can vary in quality and, therefore, tensile strength.

Finally, as it could be a medium for pathogens, concern regarding mad cow’s disease has seen it banned for use in all Veterinary surgery in Europe. It is likely this trend may continue.

In the mid 1970’s, the Suture company Davis & Geck produced a synthetic material as an alternative to chromic catgut, called Polyglycolic Acid or PGA. Ethicon followed shortly thereafter with 90% PGA and 10% Polyactic Acid (or Polylactin 910). They both perform in a similar manner. Unlike catgut, which is broken down by enzymatic action, the new materials break down more predictably via hydrolysis, i.e. exposure to water. If I take a Kleenex tissue and twist it, then pull on the ends, the tissue will exhibit some tensile strength. If I were to dunk the tissue in a bowl of water and try to pull on it again, it just falls apart and this is hydrolysis at work. So, PGA, a braided material, will absorb predictably with minimal tissue reaction at much the same rate as Chromic catgut, in that its tensile strength reduces rapidly after 2-3 weeks in situ.

More recently, two monofilament absorbables have been introduced.
  1. Glycolide & e-Caprolactone is indicated for short term soft tissue approximation – it roughly mimics the absorption profile of plain catgut; providing wound support for 1-2 weeks
  2. Polydioxanone in contrast, provides long term support for slow to heal wounds, or wounds under tension, as PDO still retains 50-80% of its tensile strength after 6 weeks in situ.

I fully expect that you know all of this but I wanted to cover it none-the-less because of what follows.

A year or so ago, the main traditional supplier of catgut for Veterinary surgery in Australia, withdrew their catgut from the market.

This immediately caused a problem for cattle vets who invariably depended upon catgut for their internal suturing needs. At about this time, I was addressing the challenge of creating needles of suitable geometry for Bovine cesarian section surgery that would not only be swaged onto a suture, but would be silicone coated. The advantage of a siliconized needle over an eyed needle is that it reduces the force required to penetrate tissue by upwards of 50% - Think modern razor blade technology. There is little point in siliconizing and eyed needle, as the first time it is placed in an autoclave for re-sterilisation, the silicone coating will be destroyed.

At the AVA Conference, 2015, Dr Jakob Malmo looked at my prototype needles and invited me down to Maffra in Victoria, to discuss my ideas.

There I spent an afternoon with Dr Jerry Davis and his team and we got down to tin tacks. They chose big 65mm ½ Circle Taper needles for uterus and muscle closure.

- If catgut was no longer available, what would their preferred material be for closing the uterus? They chose Glycolide Size 1 USP as it would readily be absorbed as the uterus collapsed over ensuing weeks.
- For muscle; PDO # 2. This would give superior support to chromic catgut.
- And for skin, #3 USP Supramid please. We armed the Supramid on two Cutting needle styles
  - A 75mm Half Circle conventional cutter with a straight shaft which we call a Ski Needle.
A 60mm straight cutting needle for those surgeons who were accustomed to having to cut the hub off an 18 gauge hypodermic needle and then feeding the supramid inside and crimp it.

“And how long would you like these sutures to be, Jerry?”

Can anyone guess how the preferred suture lengths were established? (As it turned out, 1.3 meters)

As is happens, catgut has not yet been banned here. We can still arm these needles on catgut if that is what you prefer. There may also be justification for a 90mm Taper needle for cattle with extra thick muscle. This is a work in progress.

So please just let us know what you would like created.

Dr David Beggs made it clear to me that this was not to be a commercial soap box session and I respect that. I would just make the point that these innovations would be pointless if they were unaffordable. So we have made every effort to make them at low cost.

Introduction of high visibility sutures
The second part of today’s session reviews how I continue to blunder into situations of significance

May I ask if any of you have mixed animal practices? This may be of particular interest to you in mixed practices.

Since entering the Veterinary world 3 years ago, I have spent much of that time visiting Veterinary practices. I learn something new with just about every call I make.

However, one big hole in my learning curve has been my inability to observe virtually any large animal surgery, Caesarian sections, LDA’s and Colic surgeries are not scheduled procedures, where one can book a ringside seat ahead of time. So getting to understand suture requirements for large animal procedures can be very flukey.

I was driving between practices in the Illawarra region when I noticed a modest sign on the side of the road, “Equine Embryo Transplant Centre”. Well that looked interesting, so I turned off onto a winding gravel road, to be confronted with some well laid-out horse holding paddocks and some single-storied buildings. I approached the office, introduced myself as a Suture manufacturer and asked if any vets were available.

“You’d need to talk to Jenny,” I was told “but she won’t be back until tomorrow”

When I returned the following day, I was directed to what looked like a stable but doubled up as a procedural area.

The lady I took to be Jill, had her back to me and she had a mare backed over a gateway. She had an examination glove on and her arm was buried to the armpit in the mare’s anus, with two tubes exuding from the vagina. It was about then I realised that this was possibly not the optimal time to be making a sales call, but I took the bit between the teeth and called out, “Hello, you must be Jenny. My name is Carrick Teasdel; I am a suture manufacturer.”

Jill peered at me over her shoulder and almost spat these words at me, “Well let me tell you what I DON’T like about sutures! (We’re not getting off to a very good start here) “When I am underneath a horse trying to suture a lacerated shin…AND They’re all black from the knee down…AND they don’t like me being down there…AND they are moving around…AND it’s gloomy down there…What suture colour choices do I have? Black, Navy Blue or Purple.

Why don’t you produce something that glows in the torch light? I’m usually in a barn!”
Well – Touché Jenny!

40 years in the suture business and it had never crossed my mind. If Jenny was having colour contrast challenges, so must all vets who confront suturing dark skin or amongst black hair.

As a result of this chance meeting, we produced a high quality German Fluorescent Pink Monofilament Polypropylene. It has been very well received by all vets. We nickname it Rocket Red.

Many vets, however, prefer the handling properties of Supramid for skin closure. Now the anomaly with Supramid is that on a roll, in a cassette, it looks a bright snowy white and yet in a single strand, it takes on a pearly, opalescent appearance, which can make it hard to visualise on light backgrounds, such as dogs’ bellies. So we have taken two initiatives:
Firstly – We have produced a brilliant yellow supramid that actually glows under ultra violet light
Secondly – We have swaged the fluorescent yellow supramid onto a range of super-sharp siliconized needles. Supramid no longer needs to be threaded.
And all of this came about exactly as I described to you, with a chance meeting at an embryo transplant centre.

We continue to innovate, but innovation only happens when Veterinary surgeons communicate their problems and frustrations to us, so I welcome your ideas. Please keep them coming!

I thank you for your attention and I do trust that some of this has been of interest to you.

Q. If this is so simple, why hasn’t someone thought of this before?
There are two reasons why this has not happened:
1. The hospital market for human surgery is around 20 times larger in dollars than the Veterinary market, the GP market and the dental markets combined. So research and design into suture materials and needles is focused on human surgery requirements. So the large suture manufacturers concentrate their efforts and their sales and marketing personnel in the human hospital market. They all sell direct there. If a vet, a dentist or a GP requires sutures, they choose from what is available from the hospital selection. This is a neat fit for small animals, but not so for large.
2. Between vets, dentists and GP’s in Australia, there are about 20,000 private practices. Carrying 30, 60, 90 day small suture accounts is not an attractive option for a large multinational suture manufacturer. So they rely on the wholesalers who specialise in servicing these practices to distribute their sutures for them. Therefore, these manufacturers have very little direct interface with Veterinary surgeons.

Silverglide has taken a different approach: No wholesaler interface. We talk directly to all our end users. No other suture manufacturer does this, so we very quickly get to understand their surgical challenges and what is needed to address them. We are only a small family company but need your input and we hope you will support us.

Thank you all very much for your patience with me today – I hope you found something of interest that may benefit your surgery.