# jco/interviews

# DR. JAMES F. MULICK on Impacted Canines

The treatment of impacted cuspids has frequently presented special problems in many orthodontic offices. A patient is often informed of a retained deciduous cuspid with an impacted successor at an age when orthodontic services are resisted. Such problems, along with the difficulties in obtaining objectives, and prolonged treatment times, make the complications of impacted cuspids often difficult to resolve. Dr. James Mulick is a clinician knowledgeable and experienced in this phase of orthodontics and JCO is fortunate to have him share his views with our readers. SIDNEY BRANDT, DDS, Interviews Editor

**DR. BRANDT** Can you tell us what the actual incidence of impacted cuspids is?

**DR. MULICK** Precise incidence of impacted maxillary canines varies according to the epidemiologic study for the following reasons:

(1) These studies have not established *criteria* for the definition of impaction.

(2) Most epidemiologic studies are done from full-mouth x-rays alone and probably only measure severe impactions.

An average might well be a 1% frequency in the population as a whole. Within impactions as a group, the maxillary canine is exceeded only by the lower third molar in frequency.

DR. BRANDT How about the relative

incidence of maxillary and mandibular impacted canines?

**DR. MULICK** Maxillary canine impactions exceed mandibular canine impactions by about 10 to 1 — fortunately! My superficial investigation of mandibular canine impactions shows them to be much more difficult to manage clinically, particularly if on the labial.

**DR. BRANDT** There are several suggested etiologic factors resulting in impactions. Specifically, how do each of these causes come about?

**DR. MULICK** The etiology of the maxillary canine impaction is complex and depends on a number of variables. The length of travel of the canine from its development origin to its eruption is the longest travel of the permanent teeth! If on its course, subtle skeletal, dental or functional influences affect its trajectory, impaction is possible. The more common causes for impaction are:

(a) Diminished skeletal growth of the maxilla. Extreme maxillary hypoplasia, such as facial stenosis or any of the facial clefts, obviously affects skeletal size of the maxilla when compared with its mandibular counterpart. In these cases, pseudoprognathism of the mandible results, as well as maxillary canine impactions or aberrant eruptions. More subtle or "soft signs" of maxillary retrusion likewise have an adverse effect on normal canine eruption, resulting in impaction.

(b) *Ectopic follicle*. The condition of ectopic follicle must be considered as a possibility for impaction production. The ectopic follicle is affected by many of the other factors listed herein, as well as strong hereditary predisposition.

(c) Arch length shortage. The maxillary arch size — tooth mass problem — is most likely to affect the maxillary canine, because the canine erupts as the final tooth within the arch. Whether it erupts labially, lingually, or not at all, depends on degree of space shortage. Actually, the mid-alveolar impaction is the easiest to treat — it is usually related to the classic tooth size-jaw size problem.

(d) Faulty root resorption. An excellent study by Meredith, et al., at lowa, shows the tremendous variability of angle of incidence between permanent canine cusp tip and the root end of the primary canine. If the primary-permanent rendezvous is not proper, faulty root resorption can occur and presumably further deflection of the permanent canine from its proper eruptive path.

(e) Large tooth size. The other

side of the jaw size-tooth size problem. This occurs much less frequently, believe it or not — this is not a common finding in canine impactions.

(f) *Cysts and tumors*. Historically this is a factor, although I personally have seen few cases involving canines; actually more involving maxillary central incisors.

**DR. BRANDT** There are several classifications that have been reported in the literature dealing with impacted canines. Which do you prefer?

**DR. MULICK** Ackerman and Field's classification in 1935 is the simplest. It simply says *horizontally* they are either palatal, midalveolar or labial to the arch; and *vertically* either below or above the apex. Howard, writing in *British Society for the Study of Orthodontics*, 1972, has added some additional criteria based on visualization of the impaction on lateral and posterior-anterior headfilms.

**DR. BRANDT** Where do the crowns of the permanent cuspids develop in relation to their deciduous teeth?

**DR. MULICK** The crown of the maxillary canine is first evident at 30 weeks of age. It is located high in the infant maxilla at the lateral margin of the piriform aperture. During its growth and development, it will travel the furthest distance of any of the teeth in the permanent dentition. Length of travel, therefore, is probably one of the major factors associated with impaction production, inasmuch as the developing tooth is thereby susceptible to environmental insults over a much longer period of time.

**DR. BRANDT** It is obviously essential that the clinician pinpoint the crown and root of the problem tooth. Let's

discuss this a bit. What records do you accumulate prior to treating impacted cases and what is the best method of locating an impacted canine?

**DR. MULICK** Classic determination of labial or lingual position was by means of intraoral periapical films the so-called "tube shift" method. With wider use of panoramic x-rays, display of impaction is better, but the panoramic film cannot tell you whether the canine is labial or palatal to the arch. Regional periapicals with tube shift, therefore, are needed. In addition, the vertex occlusal film is helpful. This also helps to identify the transverse alignment of the long axis. Lateral cephalometric headfilm helps to identify the long axis relative to the palatal plane and to the incisors anteriorly-posteriorly as well as the crown tip vertically. The PA cephalometric headfilm displays the vertical and mediolateral relationship of the long axis to the nasal cavity if the canine is in early development, and to the incisor teeth if the canine is later in development.

**DR. BRANDT** If a PA view is not available, what would you suggest? **DR. MULICK** Take one! Maxillary canine impactions account for a great deal of wasted time in orthodontic practices, because an accurate diagnosis is not made.

**DR. BRANDT** In the literature, a clinician reports it is unnecessary to use anything more than a periapical film with the cone directed at 90 degrees to the film. Is this sufficient for a proper diagnosis and adequate treatment plan?

**DR. MULICK** In my opinion, no.

**DR. BRANDT** Jim, do you ever palpate the lingual tissues to locate a

#### malposed condition?

**DR. MULICK** Yes, but in order to feel a "bulge", the tooth must be quite low occlusally and surrounded by a generous follicle. Many impactions lie at such an angle to the alveolus that they cannot be palpated well.

**DR. BRANDT** What are some of the symptoms of an impacted cuspid? **DR. MULICK** Some of the older literature contains rather extensive "laundry lists" of clinical symptoms attributed to maxillary canine impaction. Histories in my practice reveal only mild complaints in a few patients regarding localized pressure — and these are arch length cases anyway, with the same complaints in the lower arch without impactions. There are, however, exceptions.

**DR. BRANDT** Under what circumstances, if any, would you decide not to treat an impaction and just leave that tooth alone, and if this were done, what happens to a retained impacted canine?

DR. MULICK The old controversy regarding aggressive treatment of impacted teeth (surgically and orthodontically erupting the tooth or surgically removing the tooth) versus a more passive treatment (observation) still rages not only in reference to the impacted canine, but indeed third molars! Collection of adequate longitudinal data on "observed" impacted canines is difficult to obtain. However, I have seen many cases where, late in the development of the dentition, impacted canines have contributed directly to root resorption of both laterals and centrals on the affected side. Therefore, unless overriding medical or psychosocial factors prevail, I believe in aggressive treatment of impacted maxillary canines.

**DR. BRANDT** Some dentists and orthodontists state the cuspids are the most important teeth in the arches. Why are these teeth so essential?

DR. MULICK One merely needs to look at the contribution of the maxillary permanent canine to the upper face to sense its importance. It stands at the corner of the dental arch, forming the canine eminence for support of the alar base and upper lip. Functionally, it supports the dentition, contributing to its disarticulation in lateral movements in certain individuals. Its root length, and particularly its volume, makes it one of the most outstanding abutments for prosthetic replacement of other maxillary teeth if and when the need should be present. However, on the other hand, to attempt to bring it into the maxillary arch at all costs, disregarding its potential soft tissue and hard tissue attachment and the effect of such treatment in creating severely protracted treatment times, or without regard to adjacent teeth and their supporting tissues, is not prudent diagnosis or treatment.

**DR. BRANDT** Johnson writes, "Anything that happens to the deciduous cuspids will affect the permanent successors." Will there be fewer impactions if more deciduous cuspids were extracted?

**DR. MULICK** To my knowledge, this claim has never been systematically studied.

**DR. BRANDT** Let me inject a few administrative queries. What do you tell or promise patients prior to embarking on the treatment of an impacted cuspid?

**DR. MULICK** Particularly in these days of "consumerism", the patient (and parent) must be made fully aware of both possibilities and pitfalls. Any

impacted tooth movement involves risks of higher degree than if the tooth is not impacted. These risks are infection; ankylosis; soft tissue dehiscence because of lack of attached gingiva: and poor alveolar response related to tooth movement. Furthermore, there have been cases reported of later discoloration and devitalization and even a few bizarre circumstances, such as a periodontal membrane hypertrophic response involving virtually all of the support around the canine's apical one-half. Patients and parents should also be made aware of the importance of their role in the treatment; keeping their appointments, exercising good oral hygiene, and keeping the appliance intact.

**DR. BRANDT** Is there such a thing as an average time for treating these problem cases?

**DR. MULICK** Treatment times for malocclusions involving impacted canines is going to vary considerably, depending on associated factors, such as skeletal and dental relationships; skeletal and dental ages; arch length considerations; patient cooperation; and operator's skill in managing all the aspects of treatment. It would probably be best to frame the treatment time for such a malocclusion in terms of (a) how much time will be consumed from start of treatment to uncovering; (b) from uncovering to "canine in the arch"; and (c) from "canine in the arch" to finish. Add these three up, and you have treatment time. In other words, the addition of an impaction to malocclusion treatment plan will add "x" number of months. How many months will depend largely on two factors: (1) degree of difficulty of impaction, and (2) how soon into the uncovering phase can actual mechanically assisted tooth movement begin. For this

reason, I am a strong believer in having mechanically assisted tooth movement begin on the day of the uncovering!

**DR. BRANDT** How accurate have you been in estimating treatment times?

**DR. MULICK** Prior to my being present at the oral surgeon's office, to band the tooth at the time of the uncovering, my "track record" on impaction treatment time prediction was poor. Since then (1968), with few exceptions, it has been very good.

**DR. BRANDT** In those instances where your estimate has been incorrect and a much longer time was required to finish, what happened? Why so long?

**DR. MULICK** Prior to the time that I placed orthodontic bands at the time of surgery, extended treatment times were directly related to nonassisted eruption delays (often necessitating a second and even a third surgical assistance or uncovering). Since then, extended treatments have largely been due to patient control factors — that is, oral hygiene, not reporting lost ties or elastic ligatures, or not keeping appointments.

**DR. BRANDT** Have you ever just quit trying to complete an impacted cuspid case? If so, what were the circumstances and reasons for such a decision?

**DR. MULICK** Only once! Again, a patient-control situation where the patient could not keep appointments or proper hygiene control. Treatment was discontinued, and actually the parent was grateful.

**DR. BRANDT** Proper access to the involved tooth is essential if a success-

ful result is to be attained. Let's get your ideas on this phase of the problem. Specifically, some orthodontists have had such poor surgical exposures that they prefer to do their own. Would it be better if all orthodontists learned to do their own surgical exposures?

**DR. MULICK** I can't help feeling that if improper surgical exposures have been made, it is basically a communication problem between the orthodontist and the oral surgeon or the generalist doing the exposure. Certainly the oral surgeon or generalist can produce the proper surgical exposure if they are given *criteria*. On the other hand, if the orthodontist feels he would like to do his own exposures, certainly I cannot fault this idea. Certainly, "keyhole surgery" is not to be recommended under any circumstance.

**DR. BRANDT** Some clinicians recommend a small surgical exposure, pack the wound, and have an observation period of four to six months. During this time period, the cuspid is supposed to erupt on its own. Is this good treatment?

DR. MULICK In answering this question, I am reminded of the story that Bob Moyers, at the University of Michigan, used to tell about the sheep and the goats - the sheep, representing routine malocclusions; and the goats, representing those few cases with an extremely high degree of difficulty, and how important it is to be able to differentiate sheep from goats not only in the pasture, but in the orthodontic practice as well! Whether we like it or not, impacted canine cases are goats! Therefore, as a clinician, I have had very poor success with small surgical exposures and observation. Furthermore, it would appear that the

rest of the orthodontic community has had similar experience if we are to judge from the few surveys that have been done in the literature. Incidentally, this Journal, in July, 1970, published probably the best survey dealing with treatment of impacted canines.

Packing wounds with either periodontal pack, gutta percha, or other materials, is useful and there are many instances where we use packing postsurgically to great advantage. There are instances also, where the bone is "channeled" at the time of surgery in those rare instances when I am not present at the time of the uncovering. This is where I have determined that the deviation from normal eruption is slight - usually where first bicuspids in the maxillary arch have been extracted and where we are simply relieving or decrowding the arch. Under these circumstances, a channel is created in the direction of desired tooth movement equal to the buccallingual width of the tooth. One must be careful in channeling operations, not to encroach upon the periodontal attachment.

**DR. BRANDT** If a labially impacted or unerupted cuspid has its crown surgically exposed, will there be a tendency for that tooth to eventually have a longer clinical crown?

**DR. MULICK** In general, yes. I feel that the length of the clinical crown is really related to two or three different things. First and foremost is the condition of the attachment on the unerupted tooth. Many of these impacted teeth have very large follicles which extend below the normal clinical crown. Hence, in these circumstances, there is never "normal" attachment to begin with. Secondly, the surgical exposure itself must be generous, but at

the same time observing the periodontal membrane's integrity. If this is not observed, longer clinical crown length will result. Last but not least, the type of attachment that is placed on the crown has a lot to do with periodontal status. This is why I am definitely opposed to the use of wiring the tooth with the socalled "cervical wire" or "cervical chain". This is at best a blind procedure and cannot be done with any degree of certainty without the potential for stripping periodontal attachment.

**DR. BRANDT** Would your answer to this previous question pertain to any incisor that had its crown exposed surgically?

**DR. MULICK** It's even more of a problem with incisors, because slight differences in height of attached gingiva on incisors are much more noticeable. The same rules prevail for incisor exposure.

**DR. BRANDT** The clinician is always faced with making judgments and decisions in treatments of impactions. Let's discuss some of these. First of all, do you ever approve of moving incisors forward in order to make enough room to bring a canine into alignment? DR. MULICK If in your overall treatment plan this is required, I see nothing wrong with it. However, one must be careful with the lingually displaced lateral incisor, whose displacement is primarily because of position of unerupted canine crown. Obviously, we would not want to move the incisor root into the area occupied by the canine crown. Under these circumstances, it would be better leaving the incisor out of alignment until the canine crown is down past the area in the alveolus, normally occupied by the lateral incisor root. Alignment can then be made for the lateral incisor.

**DR. BRANDT** How do you support anchorage in those instances where you cannot afford to have the buccal segments come forward at all?

DR. MULICK Again, if in the treatment planning for the case definitive buccal segment anchorage is required, then one must consider the use of stabilizing effects of treatment, such as maximum headgear, maximum Class II elastics, or reinforcement of the fixed appliance with Nance holding arch, transpalatal arch, or upper lingual arch of some fashion. I prefer the Nance arch, provided it is not in a position of interference for the uncovering. If this is the case, I generally use a transpalatal arch or a high upper lingual arch which is distal to the area of the cuspid impaction.

**DR. BRANDT** If there is a slight arch length shortage, do you advise stripping away tooth structure in order to gain necessary room?

DR. MULICK This might be by far the easiest plan of action if it is a truly localized arch length shortage problem. Many times, however, this is an illusion produced by drift of the anterior segment toward the impaction side. Hence, it is usually not a localized arch length problem, but a generalized one, which is really bilateral in nature. Therefore, if stripping were to be done, it would probably be best to do it on all four anterior teeth in order to gain the arch length necessary to reposition them to the midline, or if they are correct and the problem is in the buccal segment on the affected side, stripping bicuspids and molars might afford the necessary room. I have not found this to be too much of a problem, because more often than not, impacted cuspid cases do not involve teeth that are of large tooth size.

**DR. BRANDT** What are your criteria for including extractions as part of treatment in impacted cuspid cases? **DR. MULICK** Essentially the same criteria as if the tooth were not impacted. Therefore, cases involving skeletal discrepancies that cannot be resolved by growth; or genuine tooth mass-arch length problems; or severe midline discrepancies; or all the other host of problems calling for extraction of some sort in order to properly align teeth.

**DR. BRANDT** In general, is it easier to treat impactions when the first bicuspids have been removed?

**DR. MULICK** If the impaction involves proximity to the first bicuspid and is a true arch length condition, then of course, bicuspid removal is necessary in order to treat the impaction. However, most of these palatal impactions lie up against lateral or central incisor, with varying degrees of axial deflection and hence, the first bicuspid extraction would be made only for arch length requirements, not for ease of treatment of the impaction per se.

**DR. BRANDT** How long after surgery do you secure the attachment to the exposed crown?

**DR. MULICK** It has been our practice since 1968 (after Warren Brown, in Ventura, California) to band the impactions at the time of the uncovering. This means being present in the oral surgeon's office to do this procedure. It, of course, takes office time away from our office, but because the appointment is scheduled as the first appointment in the morning, and one-half hour earlier than we usually see patients, it really has not had an adverse effect on starting our day on time as

usual, but has had a definite effect in terms of controlling impactions from the day of the uncovering. Therefore, after the crown is uncovered by the oral surgeon, we fit and cement an orthodonic band on the impaction with the appropriate attachment. The appropriate attachment is determined by availability of space on the crown of that cuspid.

As mentioned above, many times the crown of the cuspid is directly up against the lingual surfaces of either the lateral and central incisors, or both. Therefore, frequently the attachment must be placed on the distal-lingual angle of the cuspid. I try to position that attachment in line with the direction in which I want to start initial tooth movement. In most cases, it can be likened to taking a small boat that has run aground on a sandbar, off the sandbar, back into the proper sailing channel. We back the cuspid up off the incisors, and then move it laterally into the arch. This means having designed into your appliance some form of lingual couple, although the tie can be made directly to the buccal on the arch wire; a lingual couple in terms of a lingual cleat or lingual button on either bicuspid or molar, is quite effective. Generally, uprighting this tooth in a distal direction requires 8 to 10 weeks. That tooth can then be moved laterally into the arch. Attachments that are used include lingual buttons, if access is very slight, and incidentally the lingual button can be placed anywhere on the crown of the tooth; single brackets; or we may even go directly to a rotation bracket. It is wise not to have the bracket too big and bulky if the uncovering is deep, because it acts as a nidus for both fibrous connective tissue and/or any packing that might be placed on the tooth. Also, wing brackets feasibly could make contact with adjacent alveolar bone as the tooth is repositioned. So, in general, a low profile attachment is to be preferred.

DR. BRANDT Can you tell us your experience with bonded attachments? DR. MULICK Our bonded attachment experience is basically restricted to those impacted canines where the tooth has erupted sufficiently into the mouth to get a bonded attachment on. Most of my tough impactions are up far enough, that bonding is rendered rather difficult by the proximity of the adjacent tissues and the lack of really good moisture control. There are a number of things that are advised to cope with this problem, e.g., bone, wax, local hemostatics, hot air applied to the area, but personally I've not tried these. I find that the majority of these impacted canines have sufficient follicle that we can get a band on them, if indeed they are a good risk for being brought in.

**DR. BRANDT** Once you start moving an impacted unit, what do you like to use — steel ligatures, elastic ligatures, or coil springs?

DR. MULICK When a tooth is in an uncovered position, that is, not actually erupted into the oral cavity, but below the level of the palatal mucosa; or in the case of a labial impaction, below the level of the alveolar mucosa. I prefer to use an .012 steel ligature tied directly to the attachment on the tooth. This tie is made prior to the cementation of the band during surgery. This same tie stays with that band all the way until the tooth is into the oral cavity. At that time we may switch to a lighter steel ligature or to elastic thread, or various other modalities. However, that initial placement is critical to control of the tooth. If

we lose it, and I used to lose them when I used other types of devices, such as lighter ligature wire, elastic thread, etc., it almost always means a secondary uncovering of some type in order to gain reattachment to the tooth.

Once the tooth is erupted, then a variety of things can be used, including loops soldered to the arch wire; coil springs; or elastic thread. One must be careful not to exert too much force on these impactions. It is literally possible to extrude the tooth right out of its attachment, if too aggressive a therapy is used. Fortunately, this has only happened to me once, and I cannot say for sure that it was not an abnormal attachment that was the culprit, rather than the force that was used.

**DR. BRANDT** How often do you see the patient after initiating tooth movement of this nature?

**DR. MULICK** On periodic recalls, as are the rest of the practice; generally three-week intervals. The patient is advised to report anything unusual — sharpness, unusual looseness, or soft tissue sensitivity.

**DR. BRANDT** Is the same amount of tension usually applied? When do you vary the pressures, and why?

**DR. MULICK** Unfortunately, this is one of our cruder aspects in impacted canine treatment. I apply around 50 to 60 grams force initially and try to maintain it. If I find I am not making progress, then I will increase it slightly. This is an area that could be studied to really come up with more meaningful information.

**DR. BRANDT** What mechanics do you use to upright a root from a lingual axial inclination to a more favorable position?

DR. MULICK One of the most com-

mon problems in dealing with palatally impacted canines is failure to position the *root* of the canine into its correct position in the alveolus. Most of the time, we position the crown rather nicely, but the root is not positioned sufficiently; and if there is any tendency for relapse, that is, for the tooth to go back into crossbite position, it is because of the failure of moving the root sufficiently far to the labial.

One of the best ways to examine this condition during treatment is to place the regular patient education handmirror, much as you would use for toothbrushing instruction or for demonstrating elastic hookups, in a palatal view position in the patient's mouth. It is very difficult to move the canine root to the labial unless certain special steps are taken. One of these is to use a torque bracket on the canine. For about four to five years I have used a 22-degree upper central incisor torque bracket upside down. This throws 22 degrees of labial root torque into the cuspid, and it means that as soon as I have that cuspid close enough to the arch that I can use a rectangular arch wire, I am starting root movement on that tooth from the beginning. This root movement is a slow process, and I know no way of accelerating it, except keeping the forces in each arch wire going in the direction that you want! The use of reverse torquing springs that is, to the incisal edge of the tooth, are helpful, but generally not as efficient as having torque built into the bracket.

**DR. BRANDT** Every once in a while an effort is made to move a cuspid that is later judged to be ankylosed. How often does this occur? Can an orthodontist determine beforehand if the tooth is ankylosed? And if we think it is ankylosed, can we luxate the crown?

Does this break the ankylosis? DR. MULICK Ankylosis is the great no man's land of oral pathology! Since it cannot be produced in the laboratory, its exact nature cannot be determined. We judge ankylosis in the clinic by essentially two techniques: (1) percussion — the ankylosed tooth giving a clear, bell-like sound in comparison to the normal unankylosed tooth with its dull sound, the sound being absorbed by the periodontal membrane; and (2) the appearance of the lamina dura in the x-ray — the ankylosed tooth exhibiting a blurred periodontal membrane or, in fact, even a buildup of sclerotic bone obliterating the periodontal membrane, and the normal tooth with a normal lamina dura around the entire root. Unfortunately, in the case of the impacted tooth, one cannot percuss the tooth until it's uncovered and then at that point, I'm not so certain that you can distinguish clear sound percussion from dull sound percussion. The x-rays of impacted canines are even more difficult because of their angulation and the superimposition of many of the maxillary bony landmarks over their roots. I would say then that the beforehand assessment of ankylosis is at best a guess. Now regarding the luxation of the crown, in order to break the ankylosis - this has been reported as being successful by a number of writers. There probably is a technical difference between ankylosis and inostosis. In inostosis, a defect in the periodontal membrane has permitted ingrowth of alveolar bone into the cementum, creating a mechanical locking. It is possible to luxate the crown in the case of an inostotic lesion and be successful. Again, longitudinal study of these problems is not available. Therefore, I must say that when we deal with ankylosis, we are dealing

at best with a guess!

**DR. BRANDT** When all these mechanics are employed to move impacted cuspids labially, how can the clinician control the reactions on the buccal segments? Is there a tendency for these segments to widen?

**DR. MULICK** Obviously, if the upper arch were not stabilized properly, the natural reaction to a labial movement of a tooth with the mass of a cuspid, would be a distortion of the upper arch. This is eliminated by proper stabilization of that upper arch to offset the needed anchorage requirements. As an aside, however, I would add that a recent study by Craine, presented at the 1977 meeting of the Foundation for Orthodontic Research, showed that in general, impacted canine cases have smaller maxillary arches to begin with.

**DR. BRANDT** Are there different reactions in unilateral and bilateral impacted malocclusions?

**DR. MULICK** Yes. As with unilateral and bilateral cleft lip and palate, the management of the unilateral is often more difficult than the bilateral. One must be especially careful of arch form, midline relation, and the host of other variables with which we are dealing.

**DR. BRANDT** Jim, mandibular cuspids do not impact very frequently. In general, do the same rules apply to these complications as they do to the maxillary impactions?

**DR. MULICK** I've not really focused in my study on mandibular canine impactions. Because they occur about 10% as frequently, they do not seem to pose as many problems in my practice. However, I have had a number of mandibular labial impactions, which have consumed tremendous amounts of

time, and I would say that it would be important in treating these cases, to screen the lower lip from the area by some kind of a functional or removable appliance in order to get the tooth directed into the alveolus as quickly as possible.

**DR. BRANDT** In many instances when an impacted canine has been corrected, it has a relatively large amount of tooth movement over a prolonged period of time. There seems to be little evidence of root resorption in these cases. Can you explain this favorable phenomenon?

DR. MULICK No, I cannot explain it. I would guess that as with many instances of root resorption, we are not dealing purely with a reaction to tooth movement, but with a systemic condition. However, your observation is quite correct — the canines seem to do quite well in terms of preserving their root length despite their length of travel. The one big tissue factor problem with impacted canines is the length of the clinical crown and the amount of the attached gingiva. And as mentioned above, a lot of this is depending on preexisting conditions before the tooth erupts, and where it erupts.

**DR. BRANDT** If a cuspid erupts in transposed relation to the lateral, what would you generally do?

**DR. MULICK** This is a very difficult treatment in terms of trying to transpose the teeth, because of the possibility of moving the canine in particular out of the alveolar attachment. If it were important to do the transposition, the lateral incisor should be moved palatally, then the cuspid distally, then the lateral toward the midline and into the arch. Moving either tooth to the labial almost for certain causes loss of

tissue height on the crown.

**DR. BRANDT** There has been renewed interest in autogenous transplants of impacted canines since James Moss has published articles. Which patients are good candidates for this procedure?

DR. MULICK In general, adults. Adults have finished vertical growth of their alveolus and therefore if the tooth is transplanted, there should be no subsequent changes in vertical level of the dentition following the transplantation. Obviously, there must be sufficient arch length for the transplanted tooth and, according to Moss and other investigators, the transplanted tooth should be slightly raised in terms of its occlusion with the rest of the teeth and well supported or stabilized following the transplantation procedure. Transplantation offers an interesting modality and one that should be considered in terms of treatment planning for impacted canine.

**DR. BRANDT** What final bit of advice would you care to offer our readers on this important phase of orthodontics? **DR. MULICK** Consider the impacted canine a "goat". It is not to be regarded lightly and yet, not to be feared. Accurate diagnosis is important; adequate uncovering and mechanical assistance to eruption is critical; and proper finishing and retention is more critical than in our orthodontic cases as a whole. By proper execution of treatment planning, the orthodontist can save many months of frustration and anxiety!

**DR. BRANDT** Jim, on behalf of the JCO readers, the staff and myself, permit me to express our appreciation for your efforts and help in a difficult area of orthodontics.